ALCOHOL AND THE MENSTRUAL CYCLE

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ABSTRACT

This study explored possible antecedents in moderate women drinkers who have one or more premenstrual symptoms but are menstrating normally. The supposition that women drink more alcohol during premenstruation in order to self medicate premenstrual distress was investigated. A single subject longitudinal design was employed.

Eight moderately drinking women who reported to have premenstrual syndrome were followed, daily over two menstrual cycles. Subjects provided daily self reports of alcohol consumption, mood states and physical symptoms. Following post-experimental interviews, two additional questionnaires were administered, relating to the subjects retrospective distress across the cycle and negative attitudes toward the menstrual cycle.

Bivariate time series analysis was used to seek frequency coherence between the variables alcohol intake and menstrual cycle phase, alcohol intake and symptoms, alcohol intake and mood and finally alcohol intake and stress. Personality type was investigated using the EPI to explore for specific characteristics of this sub group.

Results indicate that moderate drinkers did not consume more alcohol during any phase of the cycle and that alcohol intake was not significantly associated with menstrual or premenstrual distress. Alcohol intake did peak at 7 - 12 day cycles suggesting a weekly perhaps weekend pattern of drinking. Risk factors or antecedents that may predispose

women with premenstrual syndrome to alcohol dependency are the women's age, personality and severity of PMS symptoms. Social and cognitive variables also play a role in a woman's alcohol consumption.

Findings also substantiated the existence of premenstrual syndrome in these normally cycling women. However these women tended to experience a significant increase in physical symptoms but not in emotional stress. Some findings of previous research are supported. The effectiveness of the measures and the designs are discussed.

CHAPTER 1

LITERATURE REVIEW

1.1 General introduction

Recent research in New Zealand indicates that in 1972 48% of women were described as "abstainers". By 1980 the figure was 14% (Casswell, 1980). In New Zealand as in other western countries the prevalence of drinking is increasing and increasing most amongst women (Shaw, 1980).

Gomberg (1981) suggests that an increase in social drinkers does not necessarily produce an increase in the number of problem drinkers. However, other evidence that drinking problems are increasing amongst women are found in three types of statistics: (i) women charged with drunken behaviour, (ii) the number of women receiving treatment for drinking problems, and (iii) women deaths related to alochol (see Tables 1-4).

In New Zealand over the last 10 years a rise in these indicators has been greater amongst women than amongst men. This same trend is reported in Britain (Shaw, 1980, Smith, 1981), and America (Beckman, 1975, Pattison and Kaufman, 1982).

A drinking problem is the "repeated consumption of alcohol leading to dependence, physical disease or other harm" (Paton and Saunders, 1981). The ICD9 (1979) use the term dependence on alcohol or "alcohol dependence syndrome". The term alcoholism is felt to be unsatisfactory as it

Table 1: Alcohol driving offences, 1973, 1974, 1976, 1982

	M.	F.	Total	% women of total
1973	8365	188	8553	2.2
1974	9091	218	9309	2.3
1976	10123	286	10409	2.7
1982	13317	762	14081	5.4

Source: Traffic Research Section, Ministry of Transport, 1983. Hurst, P.

Table 2: Numbers of alcohol related admissions to Psychiatric Hospitals

	M.	F.	Total	% women of total
1972	1894	319	2213	14.41
1973	2062	354	2416	14.65
1974	2127	389	2516	15.46
1978	2245	556	2801	19.85
1979	2394	565	2959	19.09

Source: A review of alcohol related statistics in N.Z. J.M. Valentine.

Table 3: Numbers of new contacts in alcohol and drug assessment centres.

	M.	F.	Total *	% women of total
1981	1396	537	1933	28.0
1982	1901	613	2514	24.4

* Numbers include a small number of drug abusers.

Source: National Health Statistics Centre.

Table 4: Alcohol related deaths 1967-1980

	M.	F.
1967	42	12
1968	33	8
1969	53	22
1970	70	20
1971	86	22
1972	82	27
1973	104	42
1974	162	46
1975	177	51
1976	145	44
1977	162	48
1978	145	41
1979	160	39
1980	156	38

Source: National Health Statistics Centre.

The decrease in 1976 is related to "new drinkers" - women who have yet to develop the physical symptoms of alcohol abuse. Popham Schmidt et al have referred to this as "cirrhogenic reservoir" effect (1975).

implies one disease instead of the many types of alcohol abuse which exist. Throughout this presentation, the term referred to by the quoted authors will be used, e.g. alcoholism, alcoholic, otherwise the ICD9 nomenclature is used. (See Appendix 1.)

The analogy of an iceberg appears frequently as a description of research on women and alcohol. The small portion of ice seen above the surface is a reflection of the valid research. That which is out of sight serves well to describe the research yet to be done on the growing number of women who have managed to conceal their alcohol use difficulties.

Chetwynd (1982), in a study of 655 Christchurch women working at home identified 14.7% of the sample to be problem drinkers.

Chetwynd (1982) identified problem drinkers as those replying to 3 or more items embedded in a general health questionnaire. These seven items asked if drinking had affected health, or work or caused memory loss, caused argument or embarrassment, cost too much money, or if there had been too much drunk at the wrong time or place and lastly if the subject had ever attempted to cut down Problem drinkers tended to be younger women who drank more than women 25 years and older, more frequently.

The number of studies on alcohol misuse appear to be increasing despite a reduction in social science research expenditure (Couchman, 1984, p.7). However, this does not reflect the research done by independent groups such as the Alcohol Liquor Advisory Council who are keen to find projects 'that promote prevention of alcohol misuse'

(Robertson in ALAC report, 1983). Past discussion on women and alcohol has tended to be based on studies of men; theories about why females drink are offshoots of theories about male drinking behaviour (Hoar, 1983). However, women differ from men in their physiological, psychological and social response to alcohol (Gomberg, 1981; Whitehead, 1976; Ferrence, 1979; McConville, 1983).

McConville (1983) summarizes known biological differences:

- Women's bodies are generally smaller and have a higher proportion of fat to water. Alcohol is more concentrated in human females.

- Women are more prone to liver damage and to other alcohol related diseases than are men.

- Women are more liable to develop digestive and nutritional problems as a consequence of drinking and more likely to become alcohol dependent.

- A women's response to alcohol can change during ovulation and menstruation.

- If a pregnant woman drinks there is the risk of foetal damage - fetal alcohol syndrome.

- Many women are prescribed tranquillizing drugs which in combination with alcohol make women more vulnerable to physical and psychological damage.

Johnson (1982) summarizes social and psychological differences found in a study of 1000 men and 1000 women:

- Female alcohol dependency is more likely to be preceeded by stressful life events than males.

- The current conflict of the women's role inherent in certain lifestyles could give rise to heavier drinking rates.

- Different roles demand different expectations, e.g. the working women particularly those who are married were found to be problem drinkers.

- Working women of middle and higher socio-economic levels tend to have alcohol problems.

There appears little descriptive data on women problem drinkers. What appears critical to determine is (i) onset and course of progressive drinking in women, (ii) the consequences of problem drinking for women, and (iii) an understanding of the treatment outcome for women (Corrigan, 1974).

However, females like male problem drinkers are a heterogenous group (Beckman, 1975; Gomberg, 1976). They differ on a variety of dimensions making it impossible to generalize about the female problem drinker (Horn and Wanberg, 1970).

This has led to investigations of specific sub-groups of female drinkers. Gomberg (1981) states the subgroups are recognized by either the antecedents (risk factors) or consequences of alcohol dependency. Antecedents are the genetic, biochemical psychological and social factors. Consequences are perceived as the individual's vulnerability, situational circumstances and stresses (Bourne and Light, 1979). The knowledge of antecedents or risk factors makes for understanding of factors that predispose a woman to develop dependence on alcohol.

A specific biological event unique to the female, the menstrual cycle has been related to the onset of regular drinking episodes. It is the premenstrual phase of the cycle that has been implicated as a "clear precipitant and maintainence factor of alcoholism in certain women", (Belfar and Shader, 1971; James, 1975; Jones and Jones, 1976a, 1976b; Lisansky, 1957; Lolli, 1953; Podolsky, 1963; Wall, 1937).

This chapter will review the literature regarding the relationship of the menstrual cycle and alcohol consumption. The literature is reviewed in six parts, (a) the menstrual cycle and alcohol consumption, (b) menstrual cycle and mood, (c) alcohol and mood, (d) properties of estrogen and alcohol, (e) a proposed etiology of alcoholism in women, and (f) two longitudinal studies.

1.2 The Menstrual Cycle

The physiological mechanisms of the menstrual cycle are complex. It involves the hypothalamus, the pituatary gland, the adrenal cortex, the ovaries, the nervous system, in particular the autonomic nervous system. The following is a very simplified description of the major phases of the menstrual cycle and the hormonal processes that occur during these phases.

Three major phases of the menstrual cycle are distinguished, (1) menstrual (or menses) the time of actual menstrual flow. Day one of the cycle is the first day of bleeding, (2) ovulatory, the phase when the ovum is released from its follicle. This occurs approximately mid cycle day 10-14, and (3) premenstrual, the three days

(± 3 days) immediately proceeding menstruation.

Fluctuations in the two primary ovarian hormones - estrogen and progesterone are presented in Figure 1. This shows low levels of both estrogen and progesterone during the menstrual phase and raised estrogen levels in the ovulatory phase.

Following menstruation, estrogen levels rise slowly and steadily reaching a peak at the time of ovulation. After ovulation, there is a precipitous drop in estrogen which culminates in a sharp drop during the premenstruum (Abraham et al 1972; Owen, 1975). This evidence is significant in the work of Jones and Jones (1976b) discussed later in this chapter.

1.3 The Menstrual Cycle and Alcohol Consumption

Increases in drinking behaviour to alleviate symptoms during the premenstruum and menstruum have been reported since 1937 (Wall, 1937). Driscoll and Barr (1972), Lisansky (1957), Wood and Duffy (1966) and Wall (1937) use chart reviews to describe biographic and demographic characteristics of women alcoholics in treatment. An outline of these studies is presented in Figure 2. Conclusions differ and often lack scientific rigour.

Wall (1937) states that dysmennorrhea marked the beginning of increased drinking of alcohol in a subgroup of the researched sample. Wood and Duffy (1966) seemed unimpressed with the relationship between onset of alcoholism and hormonal events.

Similarly unimpressed were Driscoll and Barr (1972) who reported that only 1 of 100 female alcoholics

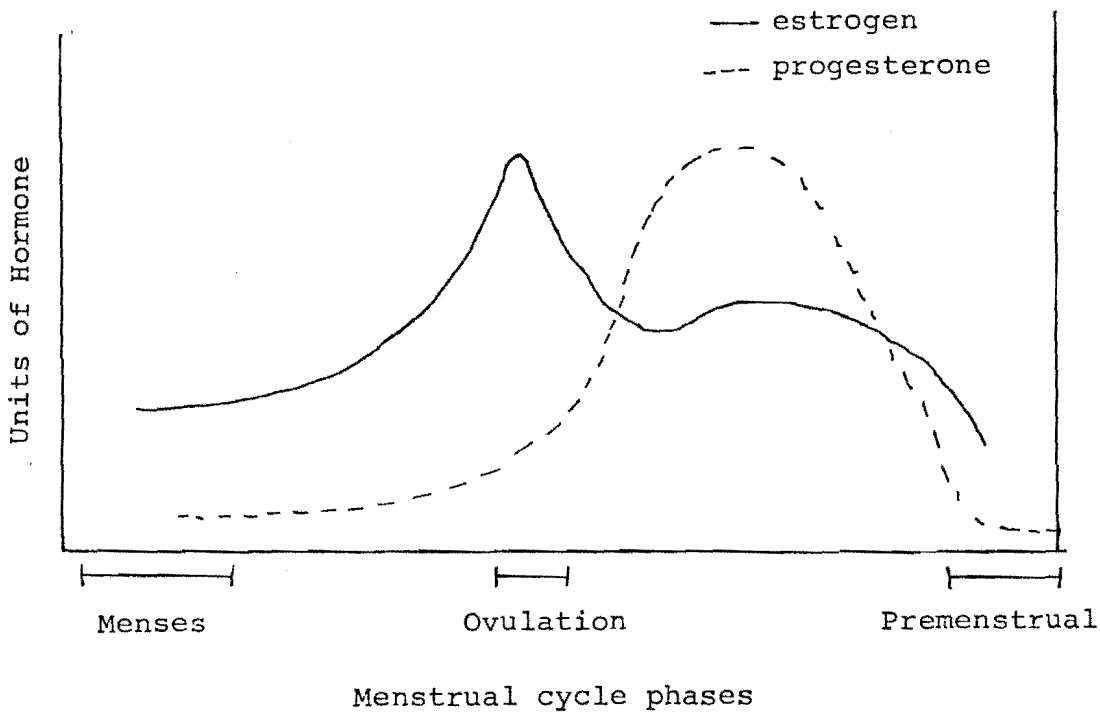


Fig. 1. Fluctuations in Estrogen and Progesterone across the menstrual cycle (from Erickson, 1977).

Cited in Ascher Svanum, 1982.

Fig. 2. Studies on alcohol and the menstrual cycle

Author/Year	Theoretical/empirical factors related to women and alcohol	Number and type of subjects	Methodology	Findings
Wall, 1937	Dysmennorrhea marks beginning of increased alcohol intake.	50 female inpatient alcoholics during 1925-1930 NY State hospital. Consecutive admissions.	Chart review to describe female characteristics.	Menstruating associated with excessive drinking.
Lisansky, 1957	Alcoholism in women has different social and psychological factors than men.	54 male, 64 female outpatient alcoholics, 37 state reformatory alcoholics. All white, average age 40, 40, 38 respectively.	Chart review to describe biographic and demographic variables.	No simple relationship between excessive drinking and premenstrual tension.
Wood and Duffy, 1966	Study of predisposing factors (familial and interpersonal) to women's alcoholism and role of alcohol in their lives.	69 female outpatient alcoholics during 1957-1964. Average age 40, middle to upper class, white.	Chart review to describe personalities of female alcoholics.	Unimpressed with the relationship between onset of alcohol and hormonal events unspecified.
Driscoll and Barr, 1972	Are there similar characteristics between female alcoholics and female drug addicts ?	100 female inpatient alcoholics. Average age 42. 100 female inpatient drug addicts average age 25. Lower middle and lower class.	Chart review and interviews to compare characteristics male and female drug addicts.	1 of 100 female alcoholics spontaneously related drinking to menstruation.

Fig. 2 (Continued)

James, 1975	Investigated Jellinek's stages of alcoholism in women.	89 female alcoholics in AA responded to mailed questionnaire.	15% mail questionnaires return rate to determine validity of Jellinek's stages of alcoholism.	31% reported increased drinking during premenstrual. 17% drank more during menses.
Belfar and Shader, 1971	Evaluation of women's premenstrual function depression and anxiety other factors as they relate to their drinking behaviour.	34 alcoholic women compared to 10 non-alcoholic women (wives of alcoholic men).	Interview, MMPl, CPl, 2 anxiety scales to determine relationship of feminity, alcoholism and menstrual cycle.	67% of menstruating and 42% of non-menstruating alcoholics related excessive drinking to the premenstruum.

spontaneously related their drinking to menstruation. Lisansky (1957) seemed more cautious and states, in the absence of data analysis, that "no simple relationship existed between increased drinking and premenstrual tension" (p.620). This author suggests a link between the stress of the menstrual cycle affect disorders and alcoholism.

Lolli (1953), published a brief review on alcoholism in women based on clinical insight during work with alcoholic and non alcoholic female drinkers. He did not focus on psychophysiological factors but noted:

> *It is frequently possible to see a connection between the onset of episodes of excessive and uncontrolled drinking behaviour and the onset of the menstrual period. A mild feeling of depression is not unusual in women a few days before their menstrual periods. This feeling is accentuated in neurotic women. Women who also bear "addictive" traits might resort to alcohol in the days immediately preceeding their period in order to get relief from their depressive symptoms. (p.10)*

Lolli infers premenstrual depressive mood to be a precipitator of excessive drinking in women if they are susceptible to drinking problems.

Podolsky (1963) focussed directly on the relationship between alcoholism and the menstrual cycle. From the case histories of 7 women he concluded "In general women drink in order to alleviate the symptoms of premenstrual tension...The tempo of drinking is increased during the premenstruum", (p.818) This conclusion is weakened by small sample size.

James (1975) used a mailed questionnaire to investigate the validity of Jellinek's stages of alcoholism in women. Of the 89 female alcoholics 31% claimed increased

drinking during the premenstruum, 17% reported drinking more during the menses. The validity and reliability of these findings is questionable as the questionnaire only had a 15% return rate.

Most reviewers cite 'the evidence' for increased drinking during the premenstruum from the study by Belfar and Shader (1971), but the authors do not describe how they obtained their information. It is assumed to be retrospective self report. The sample consisted of 34 female alcoholics and a comparison of 10 non-alcoholic women, the spouses of alcoholic men. They found 67% of the menstruating and 46% of the non-menstruating alcoholics 'related their drinking' to the premenstruum. Alcoholic women were more anxious and depressed than non-alcoholic wives. There was no discrimination 'in objective' tests (see Figure 2) between those women who increased their drinking at the premenstruum and those who did not. However, there is no evidence of statistical analysis presented. These authors concluded 'the subtle acceptance or non-acceptance of the feminine role heightened by the perception of premenstrual changes may serve as a significant stress' (p.543).

In general, empirical evidence from these studies is poor. A specific relationship between alcohol consumption and the menstrual cycle is not established. However, all authors (Belfar et al 1971; James, 1975; Lisansky, 1957; Lolli, 1953; Podolsky, 1963; Wall, 1937) claim an association between the premenstruum and increased alcohol consumption. They share the perception that the premenstruum is a meaningful stressor in some women with

problem drinking. Noted symptoms of the premenstruum were depression, anxiety, tension and irritability.

1.4 Menstrual cycle and mood

The relevance of the menstrual cycle to the well-being of women remains a controversial issue. It is debated whether cyclical changes are psychologically and/or hormonally determined and whether the changes are an abnormal process or variations of a normal pattern (Sanders et al, 1983). Most attention has been paid to the premenstrual phase. The symptoms experienced with the cyclical change is named premenstrual tension or premenstrual syndrome (PMS). The symptoms include feelings of anxiety, depression, fatigue, irritability, fluctuating mood, breast tenderness and headaches. These are experienced by women in the few days prior to menstruation. At least one premenstrual symptom occurs to a moderate degree in most women (Andersch, et al, 1980).

The first adequate epidemiological study is reported by Andersch et al (1980) quoted in Sanders et al, 1983. In a sample of 1083 Swedish women, 2-3% reported severe symptoms and 70% mild moderate emotional and physical changes before menstruation. 92% reported at least one premenstrual change in this phase.

As with research on women and alcohol, there are many methodological shortcomings in menstrual cycle research. Selection criteria have been ill-defined or restricted to those with severe symptoms or no symptoms (Haskett, 1980; Dalton, 1977). In assessing mood many studies have relied on retrospective reports (Coppen, 1963;

Moos, 1969). The validity and reliability of such methods have been questioned (Abplanalp, 1970; May, 1976; Golub , 1976). Results are susceptible to distortion conforming with expectancy or 'pleasing the experimenter' (Parlee, 1973; Rosenthal, 1969; Ruble 1977; Ruble et al, 1980).

Sanders et al, (1983) studied the interrelationship of mood and physical well-being in 55 women grouped according to symptoms severity (mean age 28) using daily questionnaires over one menstrual cycles. They demonstrated that women's initial retrospective accounts of changes in mood and physical symptoms were related to cycle phase. A peak of positive feelings and well-being occurred in the intermenstruum. Most negative feelings occurred in the premenstruum. The women who reported more severe symptoms also began to notice these earlier in the cycle. The symptoms that were more marked in women with severe premenstrual syndrome were fatigue, aggression and reduction in relaxation and sexual feelings.

The only other study using similar methodology is Abplanalp et al (1979b). They failed to demonstrate any cyclical pattern of well-being. However, their study involved only 14 subjects who had a mean age of 30. The sample was carefully screened to exclude those with psychopathology or evidence of neuroticism. In the process they may have excluded women with cyclical mood change which is not clearly distinguished from other types of mood change.

Sanders et al (1983) were also able to demonstrate "a clear temporal relationship between mood, physical state,

and hormonal phases of the cycle" (p.487). However, the pattern is not always explainable as a psychological or physical reaction to menstruation. Such cyclical patterns continue in women after the removal of the uterus (Backstrom, 1981). It is likely that an ovarian or hypothalamic factor is involved (Sanders, 1981).

These two studies (Andersch, 1980; Sanders et al 1983) give convincing evidence that there are changes in mood and physical symptoms which are related to phases of the menstrual cycle.

Coppen et al (1963) and Janowsky et al (1966) investigated for a personality factor in relation to the menstrual cycle. Early studies reported women who had menstrual symptoms were neurotic (Kessel et al 1963). More recent studies have pointed out that cyclic hormonal changes during the menstrual cycle are definitely related to menstrual symptoms (Moos, 1968). However, the personality of women may be related to their interpretation and the degree of their menstrual symptoms. For instance, extraverts who have been reported to be more outgoing than introverts (Eysenck, 1968) also may report more menstrual symptoms than introverts.

Jones and Jones (1974) found that extraverts are more affected by alcohol than introverts when tested on a task of cognitive performance. These data are consistent with Eysenck's theory that extraverts are more affected by depressant drugs and introverts are more affected by stimulant drugs on perceptual and vigilance tasks (Eysenck, 1963).

Jones and Jones (1974) divided women volunteers

into a group of extraverts and introverts by ranking EPI scores. They found a trend for extraverts to report more symptoms than introverts on the MDQ (Menstrual Distress Questionnaire, Moos 1969), during all three phases of the menstrual cycle. From this evidence they suggest either female extraverts have more menstrual symptoms than introverts or they are more willing to discuss them. Although the implications are numerous, Jones and Jones conclude that extraverts scored lower on the neuroticism scale than introverts. Menstrual symptoms appear to be negatively related to neuroticism. Therefore women do not have to be neurotic to have cramps.

In a later paper Jones and Jones (1976b) recommend the variable personality type to be included in the methodologies by future research on menstrual cycle.

In summary the support for cyclical hormonal variation to influence physical as well as psychological characteristics is strong (Klaiber et al 1972; Klaiber et al 1974; Lanson, 1975; Little, 1974; Sanders, 1981).

1.5 Alcohol and Mood

Freed (1978) has reviewed research since 1968 on the relationship between alcohol and mood. The literature included mixed findings. Motivation for drinking alcohol is for psychological benefit, tension reduction or affect improvement. Some evidence suggests alcoholics experience increasing dysphoria as a consequence of alcohol consumption (Holloway, 1972).

Non-alcoholics anticipate and generally attain elevated moods as a result of drinking (Freed, 1978).

It is noteworthy that Freed (1978) has not distinguished between men or women or recognized menstrual cycle changes, as a variable related to mood change.

Wilkinson (1971) in a study of alcoholics who completed a 90 day treatment programme, reports patients described themselves as less depressed than at the start of the programme. Mozdzierz (1971) compared a group of college students with 100 hospitalized alcoholics and found the alcoholics had a greater vulnerability to shifts in mood. Freed (1978) assessed drinking behaviour of alcoholics 3 months after discharge. They found abstinent subjects had a very low degree of affective disturbance on a self rating mood questionnaire, unimproved subjects had the highest level of dysphoria and improved subjects were intermediate.

Freed (1978) concludes that there is evidence to suggest that alcoholics show increasing anxiety and depression with alcohol consumption although they expect the reverse. There is also a social factor that determines the effective consequences of drinking. Generally non-alcoholics anticipate elevated moods and relaxation as a result of drinking and this does tend to occur.

1.6 Properties of Estrogen and Alcohol

Aschkenasy-Lelu (1958, 1960), Eriksson (1969), Mardones (1960), Tittmar (1978), and Wallgren (1970) have reported on the effect of estrogen levels during the estrous cycle and voluntary alcohol consumption in rats. Jones and Jones (1976a, 1976b, 1976c) report on estrogen

levels and the effect of alcohol consumption in normally cycling women (Fig. 3).

The animal studies of voluntary alcohol consumption throughout the estrous cycle in the rat appear methodologically sound. Aschkenasy-Lelu (1960) demonstrated that a high estrogen level (artificially induced) is associated with lowered voluntary alcohol intake. The high estrogen levels parallel the ovulatory phase in human females. It was suggested a parallel phenomenon may be found in the human female - that there is lowered alcohol consumption in the ovulatory phase of the cycle. Such a parallel phenomenon has not yet been demonstrated.

Tittmar (1978) demonstrated that continuous consumption of alcohol exerted non-estrogenic effects on the rats estrous cycle, causing estrous irregularities and infertility. Similar evidence of human female alcoholics is available. Women who are chronic users of alcohol induce an abrupt cessation of menstruation. However, after 2-3 months sobriety regular menses resume (Ryback, 1977). Wilsnack (1973) also reported a high incidence of gynaecological disorders in 28 alcoholic women. 78% compared with 35% in a matched control group reported amennorhea, difficulties conceiving, repeated miscarriages, and permanent sterility.

Jones and Jones (1976a, 1976b) recognized the fluctuations of estrogen in the human female cycle by studying the metabolism of alcohol not the consumption. They demonstrated two characteristics of the effect of alcohol on the female menstrual cycle.

Fig. 3. Studies on alcohol metabolism and estrogen

Author/Year	Theoretical/empirical factors related to women and alcohol	Number and type of subjects	Methodology	Findings
Jones and Jones, 1976a	Do women get more intoxicated than men?	30 paid volunteers 20 female, 10 male moderate social drinkers, age 21-35.	Assess peak alcohol blood level during menstrual cycle via breathalizer. Each subject was given constant amount ethanol per kg body-weight.	Premenstruating females obtain highest peak of blood alcohol levels (more intoxicated) in comparison with males and with menstruating females.
Jones and Jones, 1976b	Is there a phase in the cycle that women gain higher blood alcohol levels?	3 paid female volunteers who participated in in 1976a study.	Daily laboratory test as in study 1. Recording daily basal body temperature.	Highest peak of blood alcohol level is during the premenstruum.
Jones and Jones, 1976c	Does the level of estrogen affect alcohol metabolism?	11 females taking oral contraceptives. 11 males not taking oral contraceptives matched on age and education.	1. Assess amount of ethanol consumed during past month - retrospective self report. 2. Assess rate of ethanol metabolism during 3 cycle phases.	Users of oral contraceptives metabolic alcohol slower and stay intoxicated longer compared with non-pill users.

1. Females obtained a higher peak blood level than did males at the equivalent dose of alcohol.

2. Females tested during the premenstrual phase reached higher peak blood levels and demonstrated faster absorption rate than females in other phases of the cycle.

The difference between women and men in peak blood alcohol levels is related to the difference in body water content. The total body weight of men is composed of 55% to 65% water while the total body weight of women is composed of 45% to 50% water (Bell in Jones and Jones, 1976a). Alcohol is distributed in the body in proportion to water content and tends to be more diluted in males than females. Females have more fatty tissue and males more muscle tissue. More water is contained in muscle than adipose tissue. Therefore the peak blood level should be lower in men than women.

In another study Jones and Jones (1976b) evaluated ethanol metabolism in females taking oral contraceptives and females not taking oral contraceptives. The general trend was for women taking oral contraceptives to metabolize ethanol slower than the non-pill-taking group.

1.6.1 Estrogen, MAO and depression

Following menstruation, estrogen levels rise slowly and steadily (see Fig. 1) reaching a peak at the time of ovulation. Following ovulation there is a fall in estrogen which culminates in a sharp fall during the premenstruum. This fall in estrogen is accompanied by

a tenfold increase in monoamine oxidase (MAO) activity (Grant et al, 1968).

Ascher Svuam (1982) presents summarized additional data that supports a proposed etiology of alcoholism in women (Jones and Jones, 1976).

1. Alcohol is a monoamine-oxidase (MAO) inhibitor (Schenker et al. 1967)

2. Estrogen like alcohol is a MAO inhibitor (Janowsky et al. 1971).

3. Depression is associated with elevated MAO (Akiskal and McKinney, 1973; Grant et al. 1971; Klaiber et al. 1971, 1972, 1974; White et al. 1980).

4. Estrogen therapy has been successfully used to treat depressed women (Klaiber et al. 1971, 1974).

Jones and Jones (1976b) present a model that supposes continuous drinking to lead to suppression of estrogen levels which will be presented in section 1.7.

1.6.2 Diuretic and suppressive properties of alcohol

There is evidence that alcohol has both diuretic properties which affect water retention and the ability to suppress uterine activity. This was experimentally demonstrated in 1951 (Van Dyke et al). Alcohol may alleviate the discomfort which accompanies water retention (Moos, 1978). The premenstrual symptoms include headaches and feelings of bloating.

Alcohol may relieve lower abdominal pain and cramps experienced during the premenstrual and menstrual periods (Fuch , 1968). These are associated with the contractions of the uterus in expelling the endometrium. Alcohol has been shown to depress uterine activity in pregnant and non-pregnant women (Fuch , 1968). The degree of inhibition in non-pregnant women of uterine activity is related both to the dose of alcohol and the stage of the menstrual cycle with the most marked inhibition occurring during menstruation (Fuch et al 1968).

These two properties lend support to the etiology of alcoholism in women and are incorporated into the model (Jones and Jones, 1976b).

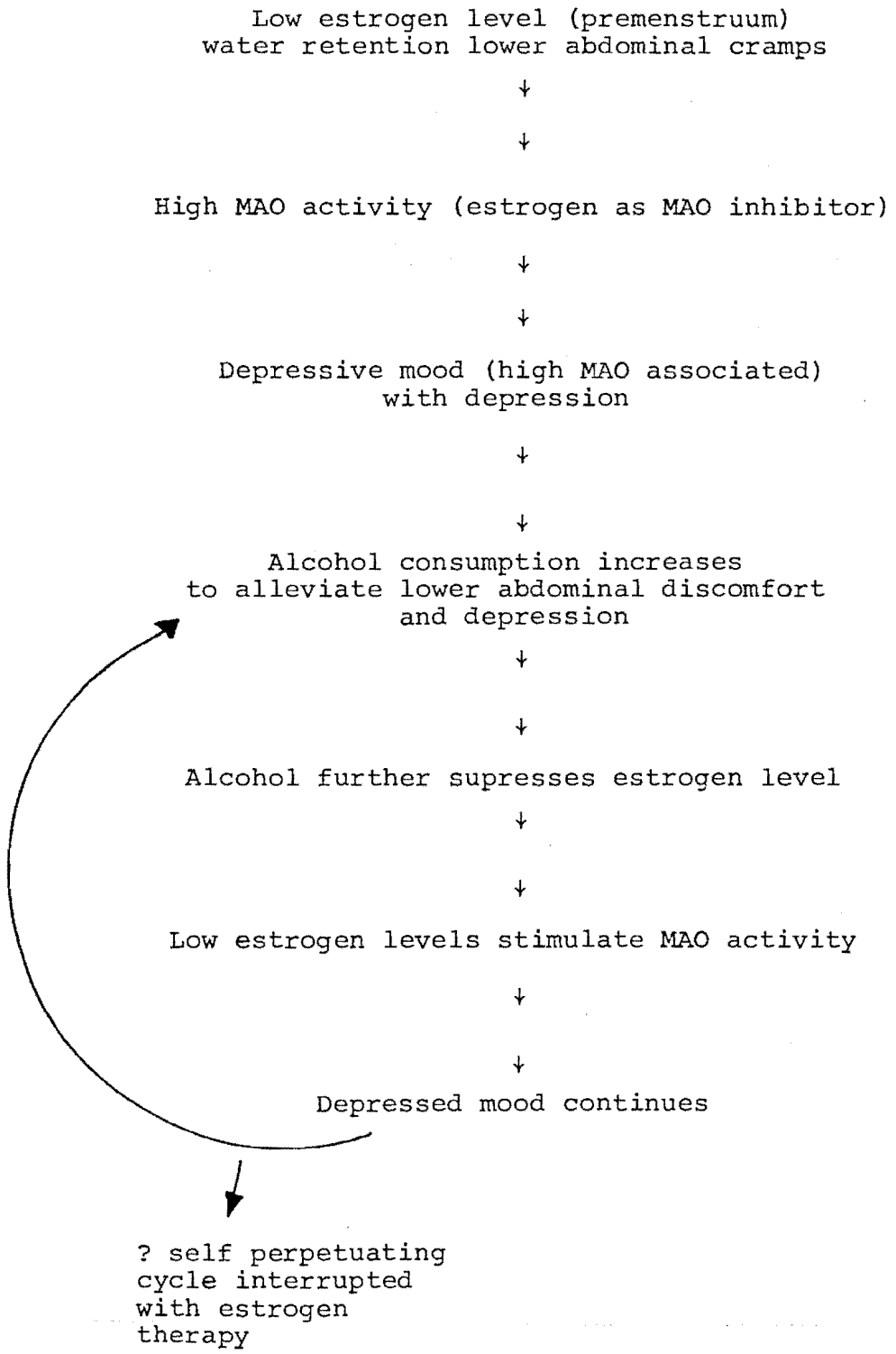
1.7 A proposed etiology for alcoholism in women

From the research on women and alcohol, Jones and Jones (1976b) propose a model for the study of alcoholism in women (Fig. 4).

A frequently reported symptom in alcoholic women is depression (Beckman, 1975; Schuckit, 1969; Winokur, 1968). Klaiber et al (1972) have noted that depressed women tend to have an elevated monoamine oxidase (MAO) level. Estrogen, a MAO inhibitor has been used to treat depressed women and Klaiber et al (1972) report it to reduce MAO levels in depressed women. These studies go further to suggest alocholic women with depression may also have elevated MAO levels.

Human females have higher MAO activity during the postovulatory phase (second half) of the menstrual cycle, than during the preovulatory phase.

Fig. 4: A model of Alcoholism in Women



Source: Jones and Jones, 1976(b) adapted by Ascher Svanum, 1982.

Klaiber et al (1972) found depressed women described more severe PMS symptoms in the premenstrual phase. Moos (1968) and Kessel et al (1963) found that normal women frequently describe dysphoria in the second half of the cycle. Jones and Jones (1976b) quote Dalton (1964) and write, "some women drink alcohol during the premenstrual phase to relieve symptoms". The former authors continue "should ethanol be an MAO inhibitor, women may consume alcohol to reduce MAO activity especially during times of low estrogen" (p.123). When estrogen increases at the beginning of a new menstrual cycle, MAO is decreased and this may reduce the need for alcohol intake.

Continuous drinking of alcohol prolongs low levels of estrogen, resulting in greater levels of MAO activity. Jones and Jones (1976c) found that this leads to depressive symptoms. Drinking alcohol relieves this dysphoria lowering MAO activity. However, the effect is short-lived. Weingold (1968) and Goss (1969) report this same phenomenon. After the intake of alcohol in heavy drinkers the euphoria is short-lived and dysphoria follows.

The continued drinking of alcohol leads to the suppression of estrogen in a similar way as testosterone is suppressed in males who drink heavily (Mendelson and Mello, 1974). Therapy to interrupt this self-perpetuating cycle would be to administer a MAO inhibitor - estrogen. This should result in reduced MAO activity and reduced depression with reduced alcohol consumption. The research on this treatment in alcoholic women is non-existent.

A consequence of alcohol consumption is a feeling of dysphoria and anger (Birnbaum et al 1983). In a sample

of 93 female social drinkers the researchers found that after a 6 week interval women who reported dysphoric mood and who were selected to reduce their alcohol intake, experienced a relative increase in their mood and fewer bouts of anger when they were sober. This was relative to women who increased their alcohol consumption. The authors did not recognize the menstrual cycle as a variable.

Birnbaum et al (1983) concluded a woman's emotional state is influenced by her previous alcohol consumption. The evidence is not conclusive but does offer support for a depressive effect resulting from alcohol intake as suggested by the etiological model of Jones and Jones (1978). The experience of dysphoria as a consequence of drinking alcohol is also reported in other studies (Freed, 1978; Wilkinson, 1971; Mozdzierz, 1971 and Hoffman, 1969).

In summary dysphoric mood appears to be an antecedent to alcohol consumption while irritibility and depressive affect have found to be a consequence of alcohol consumption.

1.8 Longitudinal studies on voluntary consumption of alcohol in women

Only two studies measured the relationship between alcohol consumption and cycle phase (Ascher Suvaum, 1982; Sutker et al 1983) using a longitudinal design. Subjects in both studies recorded daily data over two menstrual cycles. The data was collected on "psychologically robust women" who were moderate drinkers. The results are conflicting.

Ascher Svanum's sample of 93 young undergraduate women (mean age 23) indicated that moderate drinkers did

not consume more alcohol during any phase of the cycle. Alcohol intake was not associated with menstrual or premenstrual distress. This author suggests factors other than biochemical variables play a major role in women's alcohol consumption. However, the age and occupation of the subjects suggests they are:

1. more likely to report dysmennorrhea rather than PMS symptoms. Metcalfe (1980) found that premenstrual syndrome tends to be established in women with regular ovulatory cycles. Furthermore the probability that ovulation occurs at each menstrual cycle in a woman $>$ 25 years is .93 while a younger woman $<$ 25 years is .74.

2. Younger women drinkers tend to drink more, more frequently (Chetwynd, 1982). They have not established a pattern of alcohol intake (Shaw, 1980; McConville, 1983) and are less aware of premenstrual syndrome (Sanders, 1981).

Sutker et al (1983) conducted a time series analysis, within group research design using 21 women and 11 men. They were staff members of a large medical complex. These 32 adults recorded daily estimates of ongoing behaviour for two menstrual cycles or equivalent periods. The authors found women (mean age 30) to report significantly more negative moods and more frequent drinking occasions to relieve tension and dysphoria. These subjects also reported more frequent solitary drinking at menstruation.

1.9 Summary

A brief general introduction of women and alcohol in New Zealand is followed by a review of the literature relating to alcohol consumption and the menstrual cycle. It is not comprehensive and few firm conclusions can be drawn. Overall the findings suggest alcohol intake increases in those women who experience mild-severe premenstrual symptoms, particularly depression, water retention and physiological discomfort.

It is implied that a subset of these women may be susceptible to a cyclical drinking pattern that eventually leads to alcohol dependency.

Only two studies addressed the issue using a longitudinal design. The results differ. It is likely that the mean age of the sample is a significant variable.

1.10 Organisation of the remainder of this thesis

Chapter two gives a brief outline of the problem under study. In chapter three issues concerning methods for measuring alcohol intake, mood and symptoms of premenstrual tension are examined. A description of the design is presented, followed by a statement of the aims and hypotheses of this research.

The results are reported in chapter five and discussed in chapter six.

Conclusions and suggestions for future research are presented in the final chapter.

CHAPTER 2

THE PROBLEM

The supposition that some women increase their alcohol intake during certain phases of the menstrual cycle, has not yet been scientifically validated. Explanations for this phenomenon are proposed in physiological, psychological, behavioural and social terms. The most convincing is physiological research, however, most investigators allude to a complex interaction occurring.

A growing number of investigators proposed a correlation between increased alcohol consumption and the premenstrual phase of the menstrual cycle. The premenstrual phase is the seven days prior to the menstruum ± 2-3 days. During this phase some women experience psychological and physiological distress. Sutker et al (1983), Ascher Svanum (1982), Belfar and Shader (1976), Jones and Jones (1976), James (1975), Belfar et al (1971), Lisansky (1957), Lolli (1953), propose that some women self medicate with alcohol in this phase of the cycle, to alleviate negative affect and physiological discomfort. All but the first two authors used retrospective self reports and chart reviews in their research. The validity and reliability of such methods is questioned. Results are susceptible to distortion, conforming with expectancy or "pleasing the experimenter" (Rosenthal, 1969).

Sutker et al (1983) and Ascher Svanum (1982) are the only two researchers to conduct longitudinal studies assessing voluntary and spontaneous consumption of alcohol daily over two menstrual cycles. The results are conflicting. Sutker et al found a correlation between negative moods and more frequent drinking during the menses of the menstrual cycle. Ascher Svanum (1982) found no cyclical drinking pattern in her research sample.

The most convincing empirical support for biochemical changes that induce negative affect and alcohol consumption during the menstrual cycle have been described by Jones and Jones (1976a, 1976b, 1976c). These authors put forward an etiology of alcoholism in women as a result of their findings. They propose low levels of the hormone estrogen in the premenstruum induces a depressive state. This is probably because low levels of estrogen inhibit monoamine oxidase (MAO). In this state MAO is active. High MAO levels are present in persons with depression. Some women attempt to alleviate the depression with alcohol. But alcohol has the property of suppressing estrogen. This results in a self-perpetuating depressive cycle. Jones and Jones suggest estrogen therapy would interrupt this cycle. Research on this is scarce and aspects of this hypothesis remain unclear, e.g. the way in which alcohol and estrogen act as MAO inhibitors (Edwards et al 1978; Schildkraut, 1974).

Another of the major findings by Jones and Jones (1976b, 1976c), was that women gained peak blood alcohol levels sooner than men dependent on their phase of the menstrual cycle. Blood alcohol levels were higher in the

premenstruum. This was not so for women using oral contraceptives.

Koeske and Koeske (1975) proposed that some women drink more in the premenstruum to alleviate the effects of premenstrual symptoms. The explanation is based on a study where women who were lead to believe they were premenstrual reported more symptoms than another group of women who were ovulating. In terms of attribution theory women with premenstrual syndrome would perceive the drinking of alcohol to alleviate PMS symptoms as acceptable. It is a societal norm to consume alcohol to alleviate distress (Marshall, 1979).

Ascher Svanum (1982) posits a behavioural model of stimulus control. It is possible that women are medicating some discomforting bodily changes which accompany the premenstruum particularly water retention and uterine contractions.

Alcohol has a diuretic property and can reduce water retention, i.e. decrease headaches and a feeling of bloating. Alcohol can also suppress uterine activity, e.g. pain and cramps. Ascher Svanum (1982) suggests the physiological discomfort is a stimulus for drinking behaviour, with the symptoms serving as a discriminative stimuli. Ascher Svanum (1982) develops this model to include stimulus generalization. Some women may learn to react to stimuli that share similar psychological and physiological symptoms as premenstrual syndrome, by drinking alcohol.

The phenomenon is complex. Each explanation has an association with the described increase of alcohol consumed

during particular phases of the menstrual cycle. Schwartz (1982) refers to these kinds of associations to be best represented as a biopsychosocial model. This model is taken from systems theory (de Rosnay, 1979; Miller, 1978; von Bertalanffy 1968) and attempts to provide a unifying meta-theoretical framework for integrating how environmental and psychological factors interact with physiologic and biochemical processes in health and illness.

The aim of this study was to explore possible antecedents in moderate women drinkers who have one or more premenstrual symptoms but are menstruating normally.

A tentative model to explore possible antecedents is proposed here. It is represented in a diagram in Fig. 2.1.

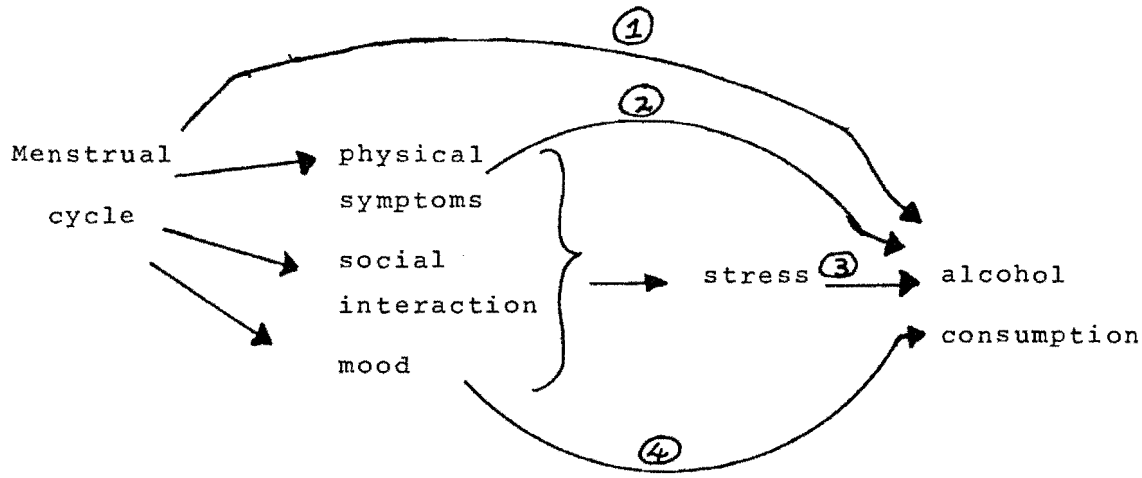
The menstrual cycle has three phases, menstrual, intermenstrual, and premenstrual. In establishing a relationship between the menstrual cycle and alcohol intake, four variables are recognized, physical symptoms, mood, social interaction and stress.

Mood summarizes a variety of feelings and emotions indicated by behavourial acts, facial expression and a person's verbal response (McKay, 1980). The visual analogue is an appropriate method to measure mood particularly dysphoric mood may be present in the premenstrual phase. It may be that a significant change in mood is an antecedent to increased alcohol consumption, (Freed, 1978).

Physical symptoms specific to the premenstrual phase and a second variable that may be an antecedent to increased drinking (Belfar and Shader, 1971; Ryback, 1977).

The third variable stress, is a condition that can

Figure 2.1: Proposed Tentative Model indicating possible antecedents in the relationship menstrual cycle - alcohol consumption



1 Hypothesis 1.
2 Hypothesis 2.
3 Hypothesis 3.
4 Hypothesis 4.

emanate from within or from the environment. In this model stress is the combined effect of mood and physical symptoms.

Social interaction and personal life events can also affect the state of stress but are considered independent of stress. Such events are, interpersonal relationships, death of family or friends, celebrations of other kinds with family and friends. Such life events may be an antecedent to increased drinking behaviour and may not be related to the cyclical variation of the menstrual cycle.

To explore these possible antecedents a longitudinal design is proposed with daily reporting of alcohol consumption, moods and symptoms over two menstrual cycles. Variations across phases would be assessed both across and within subjects.

Subjects attributions toward the menstrual cycle would be gained in a post experimental interview.

CHAPTER 3

RATIONALE

Dysphoria is a mood that presents with premenstrual syndrome. It is also experienced as a consequence of drinking alcohol (Birnbaum, 1983; Freed, 1978; Wilkinson, 1971; Mozdzierz, 1971; Hoffman, 1969).

This chapter discusses the conceptual and measurement issues of mood, premenstrual tension and alcohol. The research design is outlined, followed by a statement of the aims and hypothesis of this study.

3.1 Measurement of Mood

Moods and feelings defy absolute measurement, only their indicants can be assessed. The indicants are overt behavioural acts, facial expression and a person's verbal response (Mackay, 1980). McKay (1980) and Aitken and Zealley (1970), Wessman & Ricks (1966), suggest self report is a more accurate description than observer ratings or physiological measures (Aitken et al, 1969). However, there is little research on how to distinguish mood from emotions, personality traits or illness syndromes (Aitken and Zealley, 1970). The main method of measurement of mood is introspective verbal self-report. This is criticized for semantic inaccuracy and distortion of meaning over time (Lazurus, 1966). Mandler (1962) suggests language is too insensitive a medium for communicating private

Table 3.1: Frequently used measurement of mood

Authors	Method of Measuring Mood	Principal Mood
Aitken and Zealley (1970)	Analogue Scales	Any
Beck et al (1961)	Inventory of 21 feelings and attitudes on a 5 point scale	Depression
Clyde (1963)	Self ratings by choosing adjectives to describe mood	6 mood factors
Green & Nowlis (1957)	Mood Adjective Checklist	Many mood factors
Lorr Datson & Smith (1967)	Mood Adjective Checklist	Many mood factors
McNair & Lorr (1964)	Mood Adjective Checklist	Many mood factors
McNair, Lorr, Droppelman, (1971)	Profile of mood states (POMS)	Many mood factors
Hamilton (1967)	Observer ratings	Depression and anxiety
Jacobson et al (1978)	Mood and Symptom Checklist	Many mood factors
Osgood, Suci & Tannebaum (1957)	Semantic differential	Concepts such as self-esteem, genera evaluation and sexual evaluation
Wessman & Ricks (1966)	Mood scales using statements of mood	Many mood factors
Zuckeman (1960)	Mood Adjectives Checklist	Anxiety
Zuckerman & Lubin (1965)	Multiple Affect Adjective Checklist (MAACL)	Anxiety, hostility depression
Zung (1965)	Self ratings of categories of feelings	Depression

experiences. The most frequently used self report measures are tabled in Table 3.1.

Several studies are reviewed by McKay (1980). Most popular is the mood adjective checklist, but this has poor test-retest reliability and is prone to response sets. Administration and scoring also vary. However, two factors that have resulted from research on this method are:

1. Three core factors are associated with mood (Table 3.2).
2. Factors have bipolar dimensions.

Bond and Lader (1976) and Herbert et al (1976) report three similar factors: alertness, contentedness and calmness. Bush (1973) describes the factors to be pleasant/unpleasant, level of activation and level of aggression. Meddis (1969)* describes the factors as vigour, well-being and tension.

Table 3.2: Core factors associated with mood

Author/date	Factors
Meddis, 1969	vigour, well-being, tension
Bush, 1973	level of activation, pleasant/unpleasant, level of aggression
Bond and Lader, 1976 Herbert et al 1976	alertness, contentedness, calmness

A more frequent clinical alternative to the word check list is the visual analogue scale (VAS). VAS is a direct estimation of the magnitude of a feeling. The subject is required to place a mark across a horizontal line equivalent to the strength of a particular feeling

* In Sanders, 1981.

at the time. At the end of the line is a word (usually opposites such as tense - relaxed). The advantages of such scales are that it is easy for the subject to grasp quick to fill out and score, a small amount of subject motivation is needed and the subject can make as fine a discrimination as is needed (McKay, 1980). It reduces word response sets (Joyce, 1968). Nuances of a feeling are expressed in a continuous rather than digital form.

These scales have been tested and found to be reliable and valid indications of emotional state (Maxwell, 1978; Hall, 1980). For example, a comparative study of four depressed scales, Beck, Hamilton, Zung and Taylor, with Visual Analysis Scale showed highly significant correlations between the ratings (Davies, et al 1975; Luria, 1975). Nader and Marks (1971) and Hornblow and Kidson (1976) have tested the Visual Analogue state for assessment of anxiety and provides evidence of their validity and reliability.

As the VAS is adequate for a variety of techniques of statistical analysis (Maxwell, 1978) it was decided that visual analogue scales were appropriate for daily use in the assessment of mood during the menstrual cycle.

The issue of whether such scales are influenced by the individuals expectations or attempts to fulfil the 'experimentor hypothesis' is a complex point. Sanders (1981) suggests this effect is less likely when scales are used frequently (e.g. daily) for it would be necessary to continue biasing data over a longer time period.

3.2 Indices of PMS

A number of psychological and physiological indices have been used to identify cyclical changes in the menstrual cycle (Table 3.3). Most researchers are concerned with PMS. Psychological indices include daily mood rating (verbal ratings and VAS) depression ratings (Beck, Wessman and Ricks), Menstrual Distress Questionnaire. Physiological indices include daily reporting of symptoms using the Menstrual Distress Questionnaire, other physiological indices used are basal body temperature, hormone assays, vaginal cytology, endocrine measures in blood and urine samples as well as the first day of last menstruation.

There are several limitations to these studies listed in Table 3.3. They are, (1) retrospective reporting has been found to differ considerably from daily reports of symptoms. There is evidence of cyclic change in pain, water retention symptoms but evidence of emotional changes over the menstrual cycle are inconsistent. (2) Sample size tends to be small. This is understandable as completion of daily reports demands considerable co-operation from subjects and generates very large amounts of data for analysis.

Most studies have monitored women who were aware that the investigation was related to the menstrual cycle. It has been shown there is a stereotypic pattern of belief about menstrual cycle changes (Beumont et al 1975). Knowledge of cycle phase influences reporting of symptoms subjects expectations can influence results in research (Rosenthal and Rosnow, 1969). Ruble (1977) found women who believed they were premenstrual reported higher levels of symptoms than a

Table 3.3: Studies that review mood changes during the menstrual cycle

Authors/date	N.	Time	Phase of cycle marker	Method	Results	Cycle Phase Premens.	Inter.	Menst.
Abplanalp 1979	33	1 mth.	Dates menstruation	Daily self-rating using profile mood	Mood	no change		
					Enjoyment	no change		
Benedek & Rubenstein 1939	9+15	4-15 mths.	Vaginal cytology to assess oestrotenic status	Psychoanalysis of dream reports from women in long term therapy	Well-being		↑	
					Emotional tension	↑		
					Depression	↑		
					Relaxation			↑
Beaumont,Richards and Gelder 1975	25 (7 had hysterec.)	1 mth.	Dates menstruation	Beck Depression Inventory and daily symptom checklist	Depression	↑		
					Physical symptom	↑		
					Psychological "	↑		
					Women hysterectomy	no change		
Ivey & Bardwick 1968	26	2 mths.	Dates menstruation	Gottshalk Verbal Anxiety Scale Days 14 and 26	Anxiety	↑	↓	
					Hostility	↑	↓	
Janonsky, Berens & Davis, 1973	11	1-2 mths.	Reverse cycle days using dates of menstruation	Daily assessment of weight, K/Na ratio and moods	Negative mood	↑		
					Weight	↑		
					K/Na	↑		
May, 1976	30	2	Dates menstruation	Wessman & Ricks Depression-elation scale, rated in 3 phases, pre, inter, menstrual	Depression	↑(50%)	↑(10%)	↑(40%)
Moos et al 1978	15	2	Menstruation dates	Moos Menstrual Distress Questionnaire days 2,7,14,19, 24,25-28	Anxiety	↑	↓	
					Aggression	↑	↓	
					Depression	no change		
					Fluid retention	↑	↓	
					Pleasantness	↓	↑	↓

Table 3.3 (Continued)

Paige 1969, 1971	38	2	Basal body temperature	Gottshalk verbal anxiety scale days 4, 10, 16, 26	Anxiety Hostility	↑ ↑	↓ ↓	
Patkai Johannson Post, 1974	6	2	Dates menstruation Basal body temp.	Daily mood assess. using analogue scale	Restlessness Negative mood Sleep disturbance Length of sleep	↑ ↑ ↑ ↑		
Rouse, 1978	172	1	Dates menstruation and standardized cycle days	MDQ Retrospective at different cycle phases	Pain Fluid retention Negative moods	↑ ↑ ↑		
Silbergeld, Brast & Nobel, 1971	8	4	Menstruation date, Basal body temperature	Comaparison pill/non-pill users daily mood rating MDQ blood samples psychological testing	Pain and water retention Crying Irritibility Tension Aggression Hostility	↑ ↑ ↑ ↑ ↑ ↑	↓	↑ ↓
Zimmerman and Parlee, 1973	14	1	Dates menstruation Basal body temperature	Daily self reporting mood, pain bloatedness	Moods		no change	
Wilcoxin, Shrader and Sherif, 1976	11	1	Dates menstruation	Daily assessment MDQ Nowlis Checklist	Pain and fluid retention Depression Concentration Stressful events	↑ ↑ ↑ ↑		

group who believed themselves to be intermenstrual. In fact phase of cycle was identified for both samples. Any factor which stimulates greater awareness of the menstrual cycle is likely to bias reporting toward expectation of the symptoms (Slade, 1984).

3.2.1 Psychological Indices

The menstrual distress questionnaire (1969) is the most standard method for collecting data about the menstrual cycle symptoms. In 1978 Moos derived eight symptom groups by factor analysis on an initial 47 regularly reported symptoms (Table 3.4). Of these eight, only three are used in this study, water retention, pain and negative affect. They have been demonstrated to discriminate amongst the menstrual and premenstrual and intermenstrual phases (Silbergeld, 1971).

Over sixty studies using the MDQ report (Moos, 1977)

1. Significant internal consistency .74 - .98.
2. Significant intercycle stability .81 - .96 showing that women tend to report similar symptoms within phases across cycles.
3. Significant menstrual phase effect, specifically water retention, negative affect and pain.
4. Little or no evidence for instrument deterioration indicating suitability for longitudinal investigations.

However, Parlee (1974) claims the questionnaire concentrates too much on negative mood. For this reason most symptoms of negative affect in this study were prescribed on a bipolar scale as follows:

Table 3.4: Menstrual distress questionnaire symptom groups

Pain

- Muscle stiffness
- Headache
- Cramps
- Backache
- Fatigue
- General aches and pains

Concentration

- Insomnia
- Forgetfulness
- Confusion
- Lowered judgement
- Difficulty concentrating
- Distractible
- Accidents
- Lowered motor coordination

Behaviour change

- Lowered school or work performance
- Take naps, stay in bed
- Stay at home
- Avoid social activities
- Decreased efficiency

Automatic reactions

- Dizziness, faintness
- Cold sweats
- Nausea, vomiting
- Hot flushes

Water retention

- Weight gain
- Skin disorders
- Painful breasts
- Swelling

Negative affect

- Crying
- Loneliness
- Anxiety
- Restlessness
- Irritibility
- Mood swings
- Depression
- Tension

Arousal

- Affectionate
- Orderliness
- Excitement
- Feelings of well-being
- Bursts of energy, activity

Control

- Feelings of suffocation
- Chest pains
- Ringing in the ears
- Heart pounding
- Numbness, tingling
- Blind spots, fuzzy vision

Moos has developed a 47-item Menstrual Distress Questionnaire (MDQ) to assess menstrual cycle symptomatology, both cross-sectionally and longitudinally. Eight-factor scales emerged from factor analysis of the 47 symptoms.

Symptom	Bipolar dimension	
anxiety:	very stressed	not stressed
tension:	tense	relaxed
restlessness:	exhausted	energetic
irritability:	irritable	friendly
depression:	hopeless	confident
	unhappy	happy
concentration:	poor concentration	good concentration

Sexual feeling was also rated. Similar VAS ratings have been used by Carney et al (1978) and Sanders (1981). Adverse emotional changes before menstruation could either increase or decrease a woman's sexual feelings. The bipolar dimension read sexual feeling none - sexual feeling high.

Furthermore the interaction of alcohol on the endocrine system is complex. Although it increases sexual desire by reducing inhibitions, the central contex also impairs performance. It is possible that a reduction of central inhibition and anxiety by alcohol may increase sexual arousal (Ghodse et al 1980).

Sclaire (1970) in the analysis of women coming for alcoholism treatment found that their help-seeking was triggered by either employment or domestic stress. Women more likely than males drink for 'escape' reasons (Schuckit, 1972). They also tend to put more value on the psychotropic effects of alcohol as a mood changer, tranquilizer and psychological and physical anaesthetic.

The stress analogue scale was to investigate whether there was a relationship between subjects' view of stress, physical symptoms, mood and alcohol intake.

3.2.2 Physiological indices

There are several indices that measure physiological changes and ovulation during the menstrual cycle. In this study, self report of symptoms was chosen for several reasons.

1. The scope of this study did not allow for complex endocrine function tests.
2. The evidence for ovulation occurring at every menstrual cycle for women 25-45 years is 95% probable and for younger women only 80% (Metcalfe, 1980).
3. Reliability of symptom reporting on the MOQ is .81 - .96 (Moos, 1977).
4. Taking basal body temperature daily for 63 days was considered problematic for this voluntary sample.
5. Biochemical measures are inconsistent. Correlations between hormonal levels (measured in blood) and ratings of emotional and physical changes vary. Backstrom et al (1975), Munday, (1977) and Taylor (1979) found correlations between oestrogen levels and anxiety and irritability (reported retrospectively) No correlation was found with progesterone. However, other studies, O'Brien et al (1980), Andersen et al (1977), Smith (1975) have been unable to demonstrate hormonal levels correlate with physical and emotional changes.

In this study subjects reported on the following symptoms, on a scale from 1-5. The three symptom clusters are taken from the MDQ.

Negative affect symptoms
- mood swings
- crying
- loneliness

Water retention symptoms
- weight gain
- skin disorders
- tender breasts
- swelling

Pain symptoms
- muscle stiffness
- headache
- cramps
- general aches
- backache

3.3 Indices of alcohol consumption

Moderate drinkers rather than heavy drinkers or alcoholic females were chosen as subjects as, (1) the focus of this study was on the antecedents of alcoholism in women investigating early phases of excessive drinking - an initial drinking pattern, rather than late phases of alcohol consumption, and (2) alcholic women are known to have a high rate of amenorrhea (absence of menstrual bleeding) which is thought to be caused by chronic alcohol consumption (Ryback, 1977; Wilsnack, 1973). Since menstruation is a vital research variable its absence in some heavy drinkers and alcoholic women would have left an unrepresentative sample, if only the menstruating ones were to be chosen.

Moderate drinkers were identified according to Cahalan et al (1969) Quantity Frequency Variability (QFV) Index of Drinking. This index defines moderate drinkers as those who drink at least once a month, typically several times but who usually drink no more than 3-4 drinks per occasion. This drinking index measures the variability in quantity drunk per occasion and yields a classification of light moderate and heavy drinkers.

In the longitudinal study alcohol intake was assessed daily by the type and number of drinks consumed, the size of the drink, i.e. the size of the glass, the drinking location and the reason for drinking.

The study only employed self-report measures of alcohol consumption. In theory the best validation of self reports would be independent and objective sources of data such as blood alcohol levels or urine sample tests (Asher Svanum, 1982). However, such tests were not feasible in this study due to both research design and financial reasons. Biological tests may not always be reliable (Berkowitz, 1974 in Asher Svanum, 1982).

Another source of independent data could consist of reports of significant others, (Abrams et al 1973; Whitehead and Smart, 1972). The reliability of such reports is low (Guze, 1963; Chick, 1980). There is good evidence that self reports of drinking behaviour have high validity (Shranger et al, 1981; Single, 1975; Myers, 1983).

Summary

The literature on psychological and physiological indices of menstrual cycle and alcohol consumption is

examined. Examples of their use from recent literature is tabulated. Self report measures using the Visual Analogue Scale have good reliability and validity.

3.4 Methodology in menstrual and alcohol research

Many of the methodologies used in research on the menstrual cycle and alcohol are open to criticism. They have often been retrospective and cross-sectional in design, so causality and the role of moderating variables cannot be assessed. Experimental methodologies are rare with few longitudinal studies.

An uninterrupted time series design was used. This passive-observational approach may be employed for the purpose of causal inference reasons, (Cook and Campbell, 1979).

This method is to be distinguished from forecasting. Clearly forecasting predicts using predictive regression while causal inference uses structural regression (Cook and Campbell, 1979, p.296). This design specifically makes causal inferences about two variables measured on a time series. The interest is in testing whether changes occur in the other variable rather than in testing whether a discrete intervention has any causal impact.

Cook and Campbell (1979) point out the following shortcomings with this design. The major source of ambiguity is the inability to completely rule out third variable causation.

Another limitation is related to the criterion. The possible cause of 'Y' arises from the orderly behaviour of 'X', but this predictibility arises over and above the

behaviour on 'Y' itself over time. Covariation cannot be inferred when a series is perfectly deterministic.

Another restriction is a bias inferring causal relationships on the basis of synchronous covariation alone. It is often impossible to differentiate among alternative causal mechanisms which might explain the relationship 'X-Y'.

Finally, the magnitude of the relationship between time series depends on the extent to which the observations in any one series are factorially equivalent.

Spectral Analysis on time series data (See also Appenxix 11)

Time series are described in terms of sine and cosine waves by either a frequency domain (spectral analysis) or time domain. In the frequency domain approach to time series analysis each frequency within a given continuous range is assumed to contribute to some extent to the variation of the data over time. The aim of spectral analysis is to assess how much of the variation in the data is described by various frequency bands. The spectral density function gives the distribution of the variance of the data over different frequency bands.

Pairs of variables may be analyzed. The prime concern is to see in which frequency bands the two variables have high coherence, a measure of linear association analogues to squared correlation (Thrall and Engleman, 1981).

In this study only bivariate analysis was conducted. Results from empirical series tend to be erratic in appearance. For this reason smoothing procedures are used (Thrall and Engleman, 1981).

Design issues specific to this study

Two design issues arise in deciding what presents as an adequate research group. Firstly the subject characteristics of being a moderate drinker who have one premenstrual symptom and who are no younger than 25 or older than 40, make the possible population to draw from small. Several past and current research projects on various aspects of the gynaecology of women in Christchurch has decreased possible non biased subjects to study. Ideally women patients on a waiting list for treatment in an abstainence programme or women on a moderation drinking programme would have been a suitable experimental group. However neither of these populations were accessible to the author. Furthermore in recognizing the criteria, an undergraduate population would be unsuitable for this study.

The second issue concerns whether or not the perceived dysphoria is as a result of alcohol consumption or a premenstrual symptom.

Initial perceived dysphoria may be a premenstrual symptom which is medicated with alcohol. This in turn stimulates and enhances dysphoric mood. This research design cannot differentiate this effect.

Summary

The design of the study is discussed, with an outline of the advantages and disadvantages of the design. Spectral analysis on time series data is explained. Two important design issues regarding the research sample are raised.

3.5 Aims of the Research

The general aim of this research is to use a design that enables exploration of the relationship between menstrual cycle and alcohol consumption. Specifically this study choses a population of women identified as having premenstrual symptoms, who are moderate drinkers and who have no psychological problems or problems with alcohol. A longitudinal study is required.

To institute ideas for future research about this relationship a tentative model is proposed. The model identifies three variables; mood, symptoms and stress as outcomes of the menstrual cycle and seeks to identify a possible relationship.

3.6 Hypothesis

Using this model the hypothesis are:

1. that there is a relationship between the premenstrual phase of the menstrual cycle and alcohol consumption.
2. that there is a relationship between symptoms reported in the premenstrual phase and alcohol consumption.
3. that there is a relationship between mood and alchol consumption.
4. that there is a relationship between stress and alcohol consumption.
5. that there is a relationship between personality type, symptom reporting and alcohol consumption.

CHAPTER 4

METHODOLOGY

The experimental study consisted of two parts. Part one served as the selection process for suitable subjects. Part two consisted of collecting daily self-report data for sixty-three days.

4.1 Subjects

Ten women were recruited from the local family planning clinic and a support group for premenstrual tension. This constituted a final sample drawn from twenty-four individuals who were selected on the following criteria.

1. Had regular menstrual cycle.
2. Average cycle length was between 21-35 days.
3. Were between 25-45 years of age.
4. Had one or more premenstrual symptoms.
5. Admitted to being a moderate drinker.
6. Had no medical or gynaecological problems.
7. Had no psychiatric condition or stressful life events.

The rationale for these criteria are discussed in chapter 3.

4.2 Subject Selection

The women were recruited by two methods. A medical officer at the Family Planning Clinic asked if patients who had any premenstrual symptoms would be interested in this project. At a meeting of the premenstrual support group the researcher held a brief discussion about the study. Due to limited time this recruitment took place during a one month period.

Interested subjects completed a form, filling in their name, a contact number and the most suitable time to be contacted (Appendix 1). These potential subjects were contacted by phone and told that the study was designed to observe mood and behaviour related to the menstrual cycle over a period of nine weeks. This would include daily reporting of moods, life events, physiological symptoms and alcohol and drug intake. A questionnaire was used to screen for suitable candidates (Appendix 2). No mention was made of the real purpose of the study.

At this initial contact several subjects were screened out as they did not fulfil the specified criteria (see Section 4.1). The reasons for potential subjects not participating were that they were twenty-four years or less, did not drink, were involved in another study, felt the involvement in a nine week study would be too time-consuming or reported an irregular menstrual cycle (see Table 4.1).

Of the ten subjects in the final sample, two were excluded from the final analysis for the following reasons. During the nine week study one subject did not menstruate within thirty-five days. Both subjects also recorded a

Table 4.1: The Subjects: Reasons for not taking part in the project after expressing an interest

Group	Total No. of Volunteers	Reasons for Refusal	Total Taking Part
Family Planning Clinic	10	- involved in another current study - didn't drink - time consuming	6
P.M.S. Support Group	14	- less than 25 years - involved in previous PMS study - didn't drink - time consuming - menstrual cycle irregularity	4
	24		10

mild alcohol intake consuming small quantities of alcohol less than three times a month (mean .35 mls/kg bodyweight) in comparison with moderate drinkers (defined in Section 3), who consumed larger amounts more frequently (mean .52 mls/kg bodyweight).

Furthermore both women experienced upsetting life events. Subject 1 was informed of her mother's terminal illness who had only months to live. Subject 2 was struggling in a fragile marriage. These life events gave psychological distress and resulted in several days of unrecorded data.

All women claimed motivation to be involved in this study was clearly to be able to contribute to work on premenstrual syndrome.

4.3 Apparatus

In part one in which the selection of subjects and initial structured interview occurred four paper and pencil questionnaires were used (Appendices 2-5).

1. Initial selection questionnaire.
2. Initial Structured Interview Questionnaire.
3. Life Experiences Questionnaire.
4. Eysenck Personality Inventory.

In part two the longitudinal data was collected using a daily self report questionnaire (Appendix 6 ii). At the end of the study a menstrual distress questionnaire and negativ attitude to the menstrual cycle questionnaire was given to gain retrospective data on the menstrual cycle. (Appendix 8 and 9).

Part One

(1) The initial selection questionnaire: (Appendix 2) this brief questionnaire was administered to twenty-four potential subjects, in an attempt to identify moderate drinkers with regular cycles who had one or more premenstrual symptoms. The consumption of alcohol (frequency and quantity) and the use of other drugs such as cigarettes, barbituates, tranquillisers, birth control pill, diet pills, laxatives and antiacids was queried. Each subject was asked again if she was willing to take part in the study. Her age, a contact phone number and what the most suitable time for an indepth interview would be, were noted.

(2) Initial Structured Questionnaire (Appendix 3) was composed of 3 sections, (i) demographic and biographic data, (ii) relevant medical and gynaecological data, and (iii) alcohol and drug intake which included quantity and frequency of alcohol consumption, usual drinking setting and situation and intake of drugs, nicotine, caeffine, barbituates, analgesics, tranquilisers, diet pills, laxatives, antiacids.

The section on drinking behaviour was a combination of relevant parts from Marlatts Revised Drinking Profile (1976) and Cahalan et al (1969) Quantity Frequency Variability Index of Drinking.

(3) Life Experiences Questionnaire (LES) (Appendix 4) developed by Sarason et al (1978) was used to assess for any events that could bring about change in the lives of subjects before or during the nine week research phase. The format of the LES allows for individual rating of the impact of events and a separate measure as to the positive or negative

impact of the change.

(4) Eysenck Personality Inventory (EPI). (Appendix 5) The association between measures of personality and premenstrual syndrome have been reported in the literature. This is cited as evidence that premenstrual tension is influenced by 'neurotic tendencies', linking the severity of cyclical changes with 'neuroticism'. Using the EPI in this small sample was an attempt to identify neuroticism.

Part Two.

(1) Daily Self Report Questionnaire. This consisted of six parts.

(a) and (b): Daily mood was rated on eight bipolar scales measured by means of a visual analogue scale. These were adapted from a mood state factor analysis (Sanders, 1981), and the Menstrual Distress Questionnaire (Moos, 1978). A stress scale was included (see Section 3). Each dimension of mood is represented by a line 10 cm long representing the range of that mood. The extremes of the scales are defined in the users own terms. In this study quantity is measured in millimetres. The eight bipolar moods are listed below:

Table 1: Eight bipolar moods on a 10 cm VAS Scale

unhappy	- happy
exhausted	- energetic
tense	- relaxed
hopeless	- confident
irritable	- friendly
sexual feeling none	- sexual feeling high
not stressed at all	- very stressed
poor concentration	- good concentration

These moods were rated twice daily. The first within an hour of getting up and the second between 6-8 p.m. This was an attempt to identify whether morning or evening mood was a better predictor of overall daily mood.

(c) Daily life events was a section with general questions. The main purpose was to identify the first day of menstruation. Subjects were asked to check if any of the following happened in the last twenty-four hours. The item 'started or am menstruating' was embedded among eight other items. These were events such as becoming physically sick, having an accident, a significant other becoming sick, argument with a significant other, went to a support group. The last item was open-ended 'any other significant event'. This part of the questionnaire was repeated from a study by Ascher Svanum (1982).

(d) Physiological symptoms related to menstrual cycle phase effect were rated daily. From a factor analysis performed on forty-seven physical and psychological symptoms experienced during the menstrual cycle, Moos (1978) found eight symptom group; pain, water retention, concentration, behaviour change, autonomic reactions, negative affect, arousal and control symptoms. Only three symptom groups are used in this study; pain, water retention, and negative affect. The rationale for these cluster groups established by Moos (1978) is discussed in chapter 3.

The symptoms were rated on a scale from 1-5 as follows: (1) not experienced at all, (2) barely noticeable (3) present mild, (4) present moderate, (5) present strong. These were calculated to give three symptom scores per day.

(e) Alcohol intake was assessed by the type and number of drinks consumed, the size of the drink, i.e. size of the glass, drinking location and reason for drinking. Alcohol consumption per day was calculated for each subject using absolute mls of alcohol consumed. Alcohol beverages were coded as tabled in Table 4.2.

(f) Licit drug consumption was assessed by subjects noting their intake and number of the following drugs: caeffine, nicotine, analgesics, sedatives, tranquilizers, diet pills, laxatives, antiacids and any other drugs.

(2) Menstrual Distress Questionnaire (MDQ) (Appendix 8). The complete MDQ was administered at the end of the study. This asked subjects in retrospect to describe their experience of 47 symptoms during menstruation, intermenstrum and premenstruum. The purpose of this questionnaire was to check on the validity of retrospective self reports of premenstrual symptoms.

(3) Negative Attitudes Toward the Menstrual Cycle. Ascher Svanum (1982) constructed a questionnaire based on Osgoods Semantic Differential. There were three parts to the questionnaire (Appendix 9). Each part consisted of 35 pairs of polar terms to be rated on a 7 point scale. In order to get the mean negative attitude toward a given phase of the cycle, it was necessary to reverse the scaling of pairs whose positive polars were at the end of the 7 point scale. This resulted in a summed average score. The higher the score the more negative the attitude toward a given phase.

Table 4.2: Absolute mls of alcohol in popular sized drinks

Type	Pure alcohol strength by volume	Common Serving Size	Pure alcohol (to nearest whole number)
Beer	approx. 4%	200 mls	8 mls per glass
Light wines (Sparkling & table wines)	approx. 11%	90 mls	10 mls per glass or 82.5 mls per bottle
Fortified wines (Sherry, port)	approx. 18%	60 mls	11 mls per glass
Spirits (Gin, whisky vodka)	approx. 42%	20 mls (a nip)	8 mls per glass

Source: Alcohol: Facts and Effects, Alcohol Liquor Advisory Council, 1976.

4.4 Procedure

4.4.1 The Pilot Study

A pilot study was conducted in an effort to minimise any ambiguity in the daily diary self report sheet. A sample of ten post graduate women students completed 7 days of diary sheets and provided feedback to the author in an informal discussion. Some changes were made to the diary sheets, in line with the suggestions of this sample.

(a) The layout was reorganised to follow sequential filling out of moods and their life events.

(b) Wording in life events and alcohol consumption was simplified. Tension reduction now read 'to relax'.

(c) Concentration was changed to be rated on a VAS scale as on the severityrating from 1-5 'not to experience concentration' made no sense.

Respondents found that one sheet took less than five minutes to complete. This sample found the questionnaire relevant. As alterations were minor, the questionnaire was not tested again.

4.4.2 The Actual Study

All potential subjects were contacted. Those who followed the criteria were interviewed using the interview schedule shown in Appendix 3. The women completed an Eysenck Personality Inventory, Life Experiences Questionnaire and a consent form, (Appendices 4,5 and 7). Subjects had no knowledge of other participants in the study.

Each woman was given two weeks of daily diary sheets and a detailed statement about how to fill out the diary

sheets. A verbal explanation accompanied this to ensure understanding as interpretation by subjects of mood scales have varied in some studies (Sanders, 1981).

The study proceeded by sending each subject seven daily diary sheets weekly for nine weeks. Each week the subjects returned the completed diary sheets by post. This was to reduce response sets which might influence the ratings when mailing repeated behavioural assessments over time. It also allowed the researcher to check that the subjects were filling in the sheets correctly. Weekly contact was made by phone to each subject. A general enquiry was made and a specific enquiry as to the filling out of the questionnaire. It was also a chance for the subject to ask any questions.

In order to see if the subjects went along with the study's description, each subject was asked at the eighth week of the study to describe the purpose of the study as she perceived it. This request was placed under the guise of the need 'for clarification as it appears that while some subjects have a definite idea about the purpose of the study some others do not. I therefore ask you to briefly describe the purpose of the study, as you perceive it'.

After the termination of the daily self reports each subject was asked to respond to two additional questionnaires regarding the menstrual cycle 'since it appears that the way the menstrual cycle is perceived might be a meaningful variable in the study'. They were the MDQ and Negative Attitude Questionnaire.

4.5 The Sample

4.5.1 The demographic characteristics

The ten moderate drinkers are presented in Table 4.3. The samples average age was 34 with a range of 28 to 42 years. All were caucasian, seven were living in a married situation, two were single and had never married, one lived in de facto situation. Eight of the women had children (no more than 4) with ages ranging from 3½ - 18 years. Two women had had psychotherapy. All women rated their general health to be good to very good. Three women were in full-time employment, three in part-time, one was a full-time student and three were home-makers. Only one was the principal breadwinner. The mean weight of these subjects was 56.9 kgs. In the past all subjects had used the pill or IUD as a means of contraception. At present one used the pill, three an intra uterine device, five no contraception at all, (three of whom whose partners had had a vasectomy) and one who had had a tubiligation. Eight women had had full term pregnancies, three of these women had also had a miscarriage or termination of a pregnancy.

Menstrual cycle data gained at the initial interview is reported for each subject in Table 4.4. The mean age for each subject at commencement of menstruation was 12.5 years. More than half were informed about the menstrual cycle, however, four subjects knew very little.

The self report data on length of cycle and length of menses correlated well with recorded data. The average length of the cycle was 28 days and length of menses was 5 days. Most subjects had been aware of premenstrual symptoms both physical and emotional for an average of 8-9 years.

Table 4.3: Demographic Data for each Subject

	Age	Marital Status	No.of Children	Age Child.	Employ.	Weight (kgs)	Contraception Past / Present	Abortion	Age at 1st Pregnancy	Probs. Preg.
Subject No.1	34	M.	1	10	P/time	60.4	Pill/husband vasec.[1]	Termination[2]	19	None
Subject No.2	32	M.	3	13,12,10	F/time student	54.0	Pill,IUD/ none	-	17	None
Subject No.3	39	M.	2	13/2	P/time	60.0	Pill/tubi-ligation	-	19	Delivery
Subject No.4	28	S.	1	9	P/time	54.1	Pill/diaphram	-	19	Post-partum depression
Subject No.5	39	M.	2	15,10	-	56.4	Pill/Husband vasec.[1]	Spontaneous[4]	24	Blood loss during preg.
Subject No.6	42	M.	4	18,15,12,9	-	54.1	Pill/Husband vasec.[1]	-	24	-
Subject No.7	25	M.	2	7,3½	-	54.1	Pill/IUD [2]	-	18	-
Subject No.8	30	de facto	1	10	F/time	64.5	IUD/IUD [2]	Termination[3] - Spontaneous [4]	17	Post-partum depression
Subject No.9	39	S.	0	-	F/time	52.3	Pill/pill [2]	-	-	-
Subject No.10	34.2	M.	0	-	F/time	56.85	Pill,IUD/none	-	-	-
	£ 34					£ 56.9				

1. husband vasectomy
2. IUD: intra uterine device
3. termination: voluntary termination of pregnancy
4. spontaneous: spontaneous abortion/miscarriage

Table 4.4: Menstrual Cycle Data for each Subject

	Age (years) began menstruating	Knowledge at first menstruation	Current length of cycle reported[1]	Current length of cycle data[2]	Current length menses reported	Current length menses data	Duration	PMS Symptom Phy.	PMS Symptom Emot.
Subject No.1*	13	very little	30	29	3	4	6 mths	✓	✓
Subject No.2*	14	informed-mother	28	55(?32)[3]	7	6	8yrs	✓	✓
Subject No.3	10	very little	25-35	28	4	4	3yrs	✓	✓
Subject No.4	12	informed-mother	30	35	4	4	5yrs	✓	✓
Subject No.5	13	informed - peer group	28	28	5	5	19yrs	-	✓
Subject No.6	13	very little	30	30	5	5	5yrs	✓	✓
Subject No.7	11	informed - mother	28	28	4	4	12yrs	✓	✓
Subject No.8	12.5	informed - mother	28	35	8	10	5yrs	✓	✓
Subject No.9	14	informed - peer group	26	28	5	5	19yrs	✓	✓
Subject No.10	12.5	very little	28	28	4	4	15yrs	✓	✓

1. Reported refers to what the subject reported in the initial interview.
2. Data refers to what was recorded during nine weeks.
3. While this subject did not menstruate for 55 days at day 32 she reported several premenstrual symptoms.

* Subjects removed from final analysis as they did not conform to criteria.

4.5.2 Alcohol and drug intake characteristics

Alchol and drug characteristics are presented in Tables 4.5 and 4.6. Most of the ten subjects first started drinking in late adolescence. Subject 1 and Subject 9 began drinking at aged 7/8 years and 3 years respectively. This happened at home where they had sipped father's beer or shandy. All but one of the subjects report to have drunk to excess. Currently nine subjects drank at least weekly with only one drinking 2-3 times monthly. The preferred beverage was wine or spirits. Most drank 2-3 glasses per occasion. All subjects preferred to drink at home or at others' homes with their partner and/or friends. Some subjects could specify events or feelings in which they drank more than usual.

Most women drank coffee and/or tea. Subjects four and five were regular smokers. Nearly all subjects had taken analgesics in the month prior to this study. Few subjects took prescription or non-prescription drugs.

4.5.3 Eysenck Personality and life events profile

Eysenck Personality scores and life events profile gained prior to the actual study are tabled in Tables 4.7 and 4.8. As there were no exceptional scores in either of these questionnaires, these ten subjects were engaged in the nine week longitudinal study.

Table 4.5: Alcohol intake characteristics for ten subjects

	Age when first started drinking	Most ever drunk on one occasion (approx)	Frequency of drinking	Type of Alcohol	Amount drunk per occasion	Most likely setting	With whom	Special events
Subject No.1	7/8;sips of shandy 20yr regular drinker	To oblivion	3-4x weekly	wine/ spirits	2-3 glasses	Home Others home Restaurant Outdoors	Partner Friends	Doesn't drink 10 days prior to menstruation
Subject No.2	15 yrs.	540 mls wine	1-2x weekly	wine/ spirits	2-3 glasses	Home Bar	Partner Friends Co-workers	Aware alcohol has an effect
Subject No.3	18 yrs.	325 mls bourbon	3-4x weekly	wine/ sherry spirits	3-4 glasses	Home Others home Restaurant Social events	Alone Partner Friends	Social occasions Funerals
Subject No.4	16 yrs.	1700 mls wine over 12 hours	3-4x weekly	wine, beer	2-10 glasses	Home Others home Bar	Alone Friends	Frustrated
Subject No.5	18 yrs.	750 mls wine	daily	gin	1 glass pre-dinner 3 social	Home Others home Restaurant Social events	Partner Friends	-
Subject No.6	18 yrs.	360 mls sherry	daily	sherry	1 glass	Home Restaurant Social events	Partner	-

Table 4.5 (Continued)

Subject No.7	20 years	270 mls wine	2-3x monthly	wine	2 glasses	Home Others home	Friends	-
Subject No.8	10 yr - sips wine	5 cocktails in 1½ hrs (3½ nips per glass)	3-4x monthly	wine spirits	2 glasses	Home Restaurant	Partner Friends	-
Subject No.9	3yr sips beer 30 yr.regular drinker	750 mls wine	1-2x weekly	wine spirits	1-2 glasses	Home	Friends	Social events
Subject No.10	14 yrs.	1000 mls wine	1-2x weekly	wine spirits	5-6 glasses	Home Others home Work Restaurant	Partner Friends Co-workers	Nervous Frustrated

Table 4.6: Drug intake characteristics for ten subjects

	Coffee	Tea	Nicotine	Analgesics	Sedative	Tranquilizer	Prescribed Drugs	Non Prescribed Drugs
Subject No.1	-	-	-	✓	-	-	-	-
Subject No.2	✓	✓	-	-	-	-	-	-
Subject No.3	✓	✓	✓	-	-	-	-	-
Subject No.4	✓	✓	✓	✓	✓	-	-	✓
Subject No.5	✓	✓	✓	✓	-	-	-	-
Subject No.6	✓	✓	-	✓	-	-	-	-
Subject No.7	-	✓	-	-	-	-	Vit.B6	-
Subject No.8	✓	✓	-	✓	-	-	✓	-
Subject No.9	✓	-	-	✓	-	-	-	-
Subject No.10	✓	✓	-	✓	-	-	-	-

Table 4.7: Eysenck Personality Inventory Scores for the ten subjects

	Psychotocism	Extraversion	Neuroticism	Lie
Subject No.1	1	5	19	3
Subject No.2	1	18	19	12
Subject No.3	3	17	12	5
Subject No.4	4	15	8	8
Subject No.5	1	13	18	4
Subject No.6	1	10	13	7
Subject No.7	5	5	4	11
Subject No.8	2	17	18	16
Subject No.9	2	8	4	0
Subject No.10	7	19	21	7

Means and standard deviation for females aged 30-39*

P = 2.28
SD = 2.20
E = 11.97
SD = 4.95
N = 12.57
SD = 5.28
L = 8.84
SD = 4.05

* Eysenck and Eysenck (1975).

Table 4.8: Impact of Life Experiences Survey for the ten subjects

	Positive Score	Negative Score	Total
Subject No.1	0	3	3
Subject No.2	0	2	2
Subject No.3	9	12	17
Subject No.4	6	3	9
Subject No.5	4	0	4
Subject No.6	0	7	7
Subject No.7	0	6	6
Subject No.8	6	6	12
Subject No.9	2	0	2
Subject No.10	13	3	16

Means and Standard Deviation for females*

	M	SD
Positive	9.57	5.51
Negative	7.04	7.90
Total	16.61	10.23

* Sarason, Johnson, Siegel (1978)

CHAPTER 5

RESULTS

Data analysis of this uninterrupted time series study was carried out on eight subjects who completed nine weeks of daily recordings and who conformed to the criteria of cycle length menstruating at a mean of 25-35 days. Two subjects were eliminated after data was collected as they did not conform to the criteria.

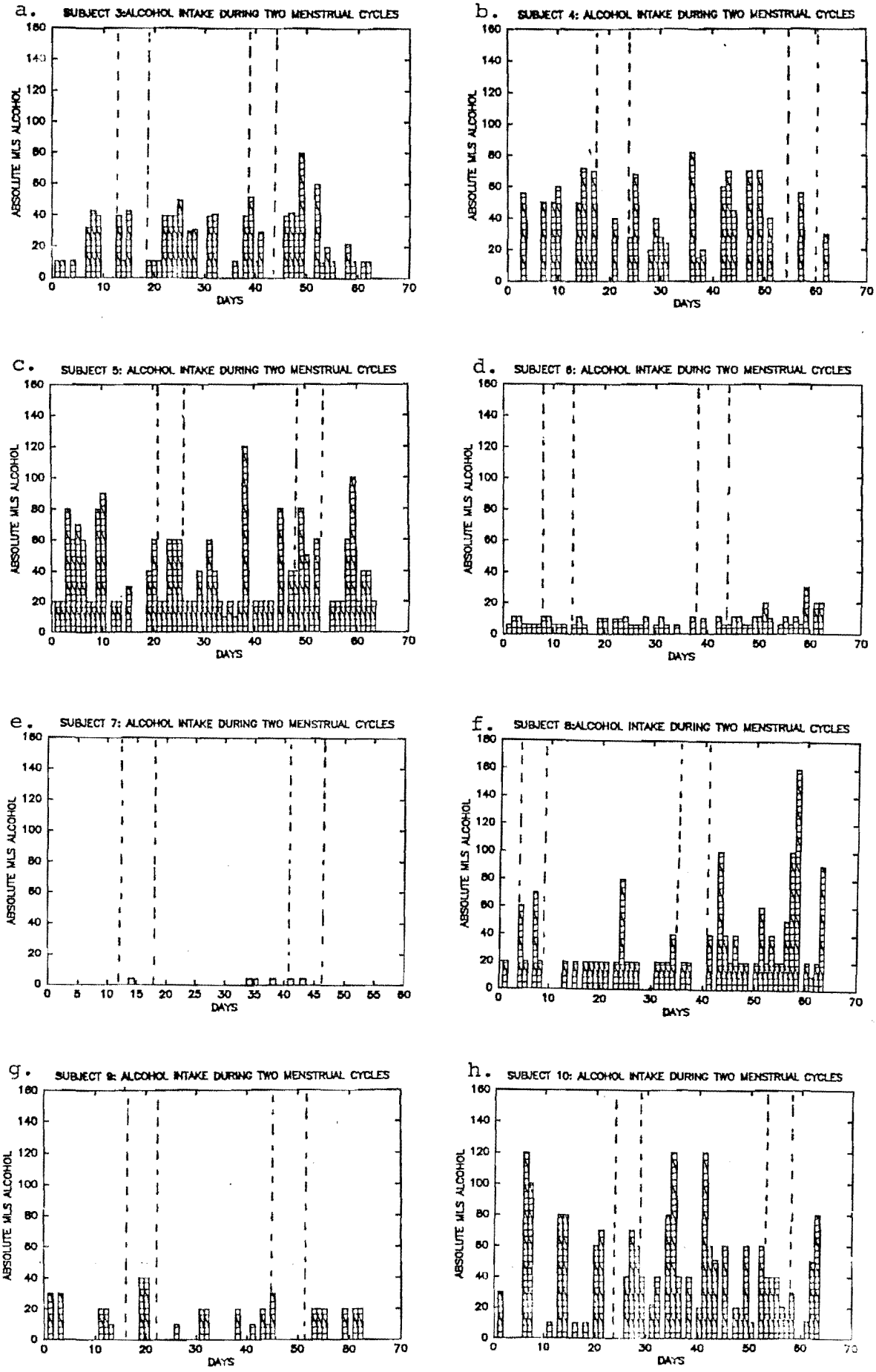
Ratings from the daily diaries were coded and analysed using Burroughs 6900 computer with BMDP computer packages (Dixon et al, 1981). For each cycle average scores within three cycle phases were calculated. The menstrual phase was the first 7 days of the cycle with the first day of menstruation being day one, the premenstrual phase was 7 days prior to menstruation and the intermenstruum were those days between the menstruum and premenstrual phase. Symptom scores, mood scores and alcohol intake for those phases were calculated.

In order to test this study's hypotheses the data analysis was divided into two parts. Part 1. Alcohol use characteristics of the sample Part 11. Alcohol consumption and the menstrual cycle.

Part 1. Alcohol use characteristics.

Daily alcohol intake for 8 subjects is graphed in Fig. 5.1. Subjects reported a mean intake of 29.526 mls absolute alcohol per drinking occasion. The correlation

Fig. 5.1. Alcohol intake for 8 subjects.



Premenstrual Phase.

Table 5: 1:

Retrospective and self monitored alcohol intake for 8 subjects.

	Retrospective report of alcohol consumption (absolute mls alcohol)	Self monitored recording of alcohol consumption (ab. mls alcohol)
Subject 3	32	29.184
4	40	47.462
5	20	40.00
6	11	9.469
7	10	4.000
8	32	35.023
9	20	21.429
10	50	49.641
	= 26.875	= 29.526

r = .84 (p.01)

Table 5.2: Recorded Alcohol use Characteristics during two menstrual cycles.

	Mean Absolute Mils Alcohol	No. of occasions alcohol consumed during 63 days	Type of alcohol (frequency)				Reason for drinking *					Where		
			Spirit	Fortified Wine	Wine	Beer	pleasure	enhance mood	relax	social pressure	Restaurant	Bar	Home	Other's Home	Party
Subject 3	29.18	40	16	20	10	0	34	4	1	0	1	4	27	8	0
Subject 4	47.46	26	4	1	19	11	15	5	18	0	9	1	7	10	6
Subject 5	40.00	53	44	0	14	0	36	1	16	0	1	2	43	7	0
Subject 6	9.47	49	2	39	8	0	16	0	25	8	0	0	50	0	0
Subject 7	4.0	6	0	0	0	6	2	0	1	3	0	0	6	0	0
Subject 8	35.02	44	37	0	13	0	10	5	34	6	3	3	38	1	0
Subject 9	21.43	21	9	0	12	0	21	0	0	0	4	0	14	3	0
Subject 10	49.64	39	20	5	23	0	11	1	30	0	4	6	12	18	1
Total mean	29.526		16.5	8.125	12.37	8.5	18.125	2.0	15.62	2.12	2.75	2.0	24.6	5.87	1.75
SD	16.84		16.40	14.23	6.94	4.15	11.77	2.26	13.67	3.22	3.01	2.20	17.30	6.22	2.96

* Subjects occasionally indicated two reasons.

between self-reported daily drinking and retrospective estimates was high. $r = .84$ ($p.01$) Table 5.1.

General alcohol use characteristics during the 63 days are noted in Table 5.2.

On 83.6% of all drinking occasions they tended to drink for pleasure (52% of all drinking occasions) and to relax 45.2% of all drinking occasions and only occasionally to enhance mood (5% of all drinking occasions). Only 3 subjects drank for reasons of social pressure. 71% of all drinking occasions were at home. There were no singular motives for alcohol consumption in this group of female drinkers across situations.

Part Two: Alcohol consumption and the menstrual cycle.

The first hypothesis of the study suggests that alcohol consumption will increase during the premenstrual phase and be lowest during the intermenstruum in normally cycling women. To test this hypothesis several analysis were performed, on both individual subject's data and the group as a whole.

Firstly alcohol intake was summed for each phase of each cycle. Correlations were then calculated for alcohol intake between the three phases of each subject's menstrual cycle. Results in Table 5.3 show a low correlation between alcohol intake for any phase of the menstrual cycle. The two menstrual cycles for each subject were also correlated for alcohol consumption. There was no significant variance between cycles for any subject indicating each subject recorded similar alcohol intake per cycle phase.

Table 5.3:

Correlations for each subject on the variables, phase of cycle and alcohol intake for each recorded cycle

	Cycle Number	Phase/ alcohol correla-tion	F. Ratio
Subject 3	1	- .06	F (1,32) 1.64 p.20 N.S.
	2	.00	
Subject 4	1	.20	F (1,24) .02 p.88 N.S.
	2	.01	
Subject 5	1	.09	F (1,45) .22 p.64 N.S.
	2	.25	
Subject 6	1	- .08	F (1,44) 1.79 p.18 N.S.
	2	.22	
Subject 7	1	.00	F (1,0) 0 p 1.0 N.S.
	2	.00	
Subject 8	1	- .26	F (1,42) 3.05 p.08 N.S.
	2	.05	
Subject 9	1	.37	F (1,16) 1.31 p.26 N.S.
	2	.24	
Subject 10	1	- .10	F (1,30) 1.89 p.17 N.S.
	2	- .04	

Scores for the variables, alcohol intake, mood, physical symptoms and stress were then summed for each phase and are reported in Table 5.4. Each subject shows individual variation in each of the three phases for each cycle. Variance is most marked in both premenstrual and menstrual phases.

Subject 7 only shows a significant difference in alcohol intake between the intermenstrual and premenstrual phases $F(2,53)\ 3.58 \leq p.034$. It needs to be noted that this result presents in the most moderate drinker of the study. A histogram of alcohol intake for this subject in Fig. 5.1(e) clearly shows this subject has the lowest frequency and intake of alcohol. Therefore any intake of alcohol would register as a significant difference.

Subjects 3, 4, 6, 7 and 8 show differences between phases in the variables stress, mood and physical symptoms at a probability of less than .05. However, the variance is not consistently related to the premenstrual phase.

An ANOVA was then performed on the variables alcohol intake and phase of cycle for the total sample. Results in Table 5.5 show there is no main effect for cycle on alcohol intake, $F(1)\ 0.01 \leq p.938$. There was also no main effect for phase of cycle on alcohol intake, $F(2)\ .24 \leq p.792$. And finally there was no cycle x phase interaction with the dependent variable alcohol intake. $(F(2)\ .00 \leq p.996)$.

These results fail to support the null hypothesis. There is no significant increase in alcohol consumption in the premenstrual phase in this sample of normally cycling women with reported premenstrual syndrome.

The second hypothesis suggests a relationship between

Table 5.4: Descriptive statistic summary table for each subject for phase of cycle with variables, absolute mls alcohol, stress, mood and physical symptoms

	Cycle Phase	Days	Alcohol		Stress		Mood		Physical symptoms	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
Subject 3	1	14	13.97	17.99	134.71	36.52	439.07	241.35	24.57	6.84
	2	34	18.70	20.63	81.73	45.71	758.42	237.28	19.47	5.07
	3	14	18.53	19.75	101.40	57.47	590.26	274.06	23.26	5.45
			F(2,60).307 p.73		F(2,60) 6.34 p.003		F(2,60) 8.80 p.004		F(2,60) 5.10 p.009	
Subject 4	1	10	16.60	23.92	65.60	27.35	731.50	151.49	20.10	2.9
	2	37	21.62	27.42	95.48	35.71	600.27	224.45	21.67	8.01
	3	14	19.14	29.07	102.71	23.70	583.42	158.13	31.64	9.47
			F(2,58).147 p.863		F(2,58) 4.363 p.017		F(2.58) 1.943 p.152		F(2,58) 9.47 p.0003	
Subject 5	1	14	27.14	20.16	22.42	12.53	976.78	126.82	14.64	3.24
	2	35	35.71	30.61	36.45	28.24	890.94	237.84	14.42	3.79
	3	14	35.00	29.02	29.42	24.66	899.07	301.40	16.57	1.69
			F(2,60).478 p.621		F(2,60) 1.672 p.196		F (2,60) .693 p.503		F(2,60) 2.148 p.011	
Subject 6	1	14	6.14	3.99	102.07	16.61	865.21	69.12	17.35	1.98
	2	34	8.79	6.55	81.29	18.71	907.50	56.45	16.02	1.29
	3	15	5.26	4.33	91.26	18.59	820.13	96.19	18.66	3.73
			F(2,60) 2.48 p.092		F(2,60) 6.68 p.002		F(2,60) 8.294 p.0007		F(2,60) 7.49 p.001	

Table 5.4 (Cont.): Descriptive statistic summary table for each subject for phase of cycle with variables, absolute mls alcohol, stress, mood and physical symptoms

	Cycle Phase	Days	Alcohol		Stress		Mood		Physical symptoms	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
Subject 7	1	13	0.00	0.00	107.61	41.10	528.61	256.51	17.38	2.18
	2	29	0.27	1.03	97.96	37.91	677.82	184.74	16.00	2.17
	3	14	1.14	1.87	101.64	46.70	673.00	191.38	14.50	1.82
			F(2,53) 3.58 p.034		F(2,53 .250 p.779		F(2,53) 2.59 p.08		F(2,53) 6.41 p.003	
Subject 8	1	14	25.00	30.57	113.21	55.33	381.92	260.80	26.50	5.61
	2	37	27.32	32.77	59.37	54.51	887.83	274.06	20.18	6.44
	3	11	16.36	19.63	108.81	35.17	597.63	251.08	28.72	8.60
			F(2,59) .549 p.580		F(2,59) 7.47 p.003		F(2,59) 9.33 p.0003		F(2,59) 9.18 p.0003	
Subject 9	1	14	5.00	8.54	30.35	19.24	997.50	43.81	13.57	0.75
	2	35	6.85	10.22	30.68	16.77	921.57	189.53	13.00	0.00
	3	14	10.00	15.68	26.21	7.47	1021.28	28.98	13.21	0.57
			F(2,60) .706 p.497		F(2,60) .416 p.661		F(2,60) 2.61 p.081		F(2,60) 8.38 p.0006	
Subject 10	1	20	25.20	30.98	70.10	47.31	746.95	255.74	27.75	14.62
	2	19	35.55	39.79	76.62	45.68	662.10	174.52	23.75	6.09
	3	14	28.64	27.08	100.78	45.95	559.78	252.17	30.57	12.56
			F(2,60) .560 p.574		F(2,60) 1.948 p.151		F(2,60) 2.971 p.058		F(2,60) 2.01 p.142	

Table 5.5: ANOVA Summary Table.

ANOVA on cycle and phase of cycle for dependent variable alcohol intake.

Source	SS	DF	MS	F	P
Alcohol intake * cycle	0.666	1	0.666	0.01	.9382 (N.S.)
error	832.000	8	104.000		
Alcohol intake * phase	56.333	2	28.166	.24	.7929 (N.S.)
error	1914.000	16	119.625		
Alcohol intake * cycle * phase	1.444	2	0.722	.00	.9968 (N.S.)
error	3634.888	16	227.180		

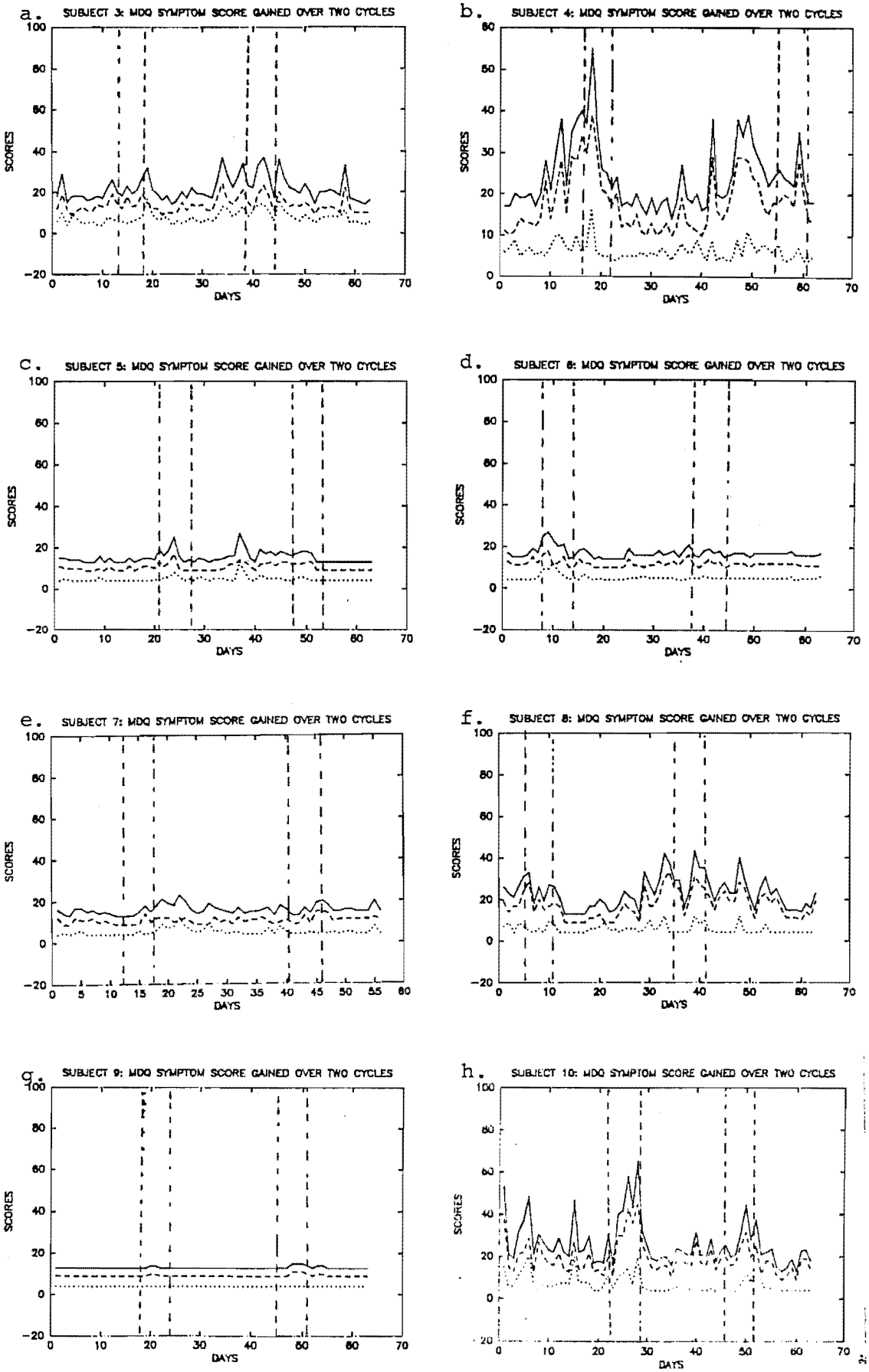
symptoms reported in the premenstrual phase and alcohol consumption. It may be that the symptoms are distressing and some women medicate their symptoms with alcohol.

To test this hypothesis it was necessary to establish those symptoms that occur specific to the premenstruum. Raw data for symptom scores are graphed in Fig. 5.2. The total symptom score was derived from Moos' study and was condensed into two sub scores, Physical symptoms (pain and water retention) and psychological symptoms (negative affect). On visual analysis all subjects indicate a peaking of symptom scores in the premenstrual phase. Subjects 3 and 10 show physiological and negative affect scores contributing similarly to the symptom score. Subjects 4, 6, 7, 8, 9 have physiological symptoms contributing most to the total score. Only subject 5 shows negative affect to contribute most to the variation of the symptom score. Subjects may report greater physiological scores as they are aware the study seeks specific information on premenstrual symptoms and are more aware of the physiological symptoms.

An ANOVA was performed on the variables symptoms x phase of cycle. Results in Table 5.6 show there is no main effect for cycle on symptoms. (F (1) 0.06 - p.2142.) However there was a main effect for phase of cycle on symptoms. (F (2) 3.79 - p0.0449.) Mean symptom scores were greatest in the premenstrual phase. These results confirm premenstrual syndrome to be present in this group of women.

A bivariate time series analysis was performed to see if the two series of data, alcohol consumption and symptoms, cycle at the same frequencies. Appendix 11 gives a

Figure 5.2: Daily physical symptom and negative affect scores derived from MDQ.



Key:

premenstral phase

total daily symptom score

physical symptoms (pain and wate retention)

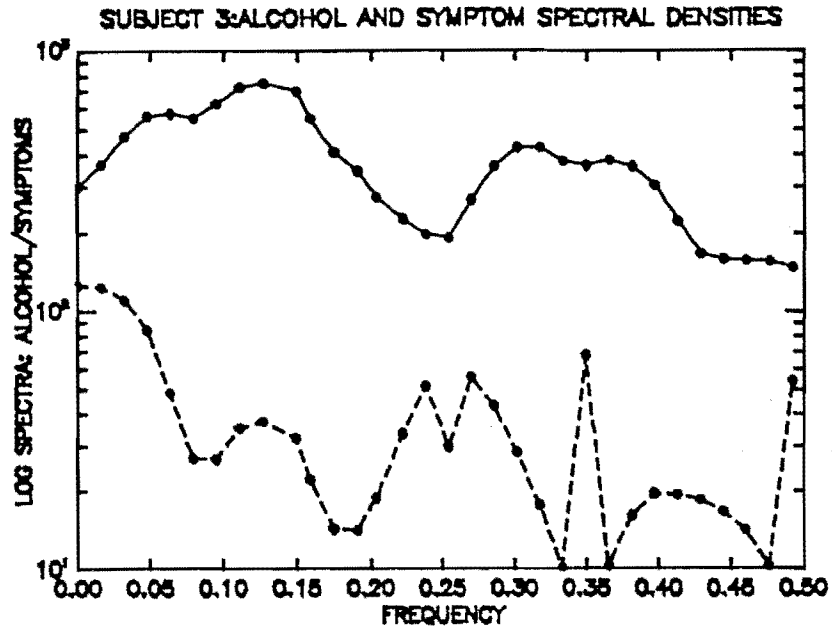
Table 5.6: ANOVA Summary Table.

ANDOVA on cycle and phase of cycle for dependent variable symptoms

Source	SS	DF	MS	F	P	
Symptoms x cycle	0.4629	1	0.4629	0.06	.8058	N.S.
error	57.3703	8	7.1713			
Symptoms x phase	87.4444	2	43.7222	3.79	0.044	*
error	184.5555	16	11.5347			
Symptoms x cycle x phase	23.5925	2	11.7963	1.70	.2142	N.S.
error	111.074	16	6.9421			

* Significant.

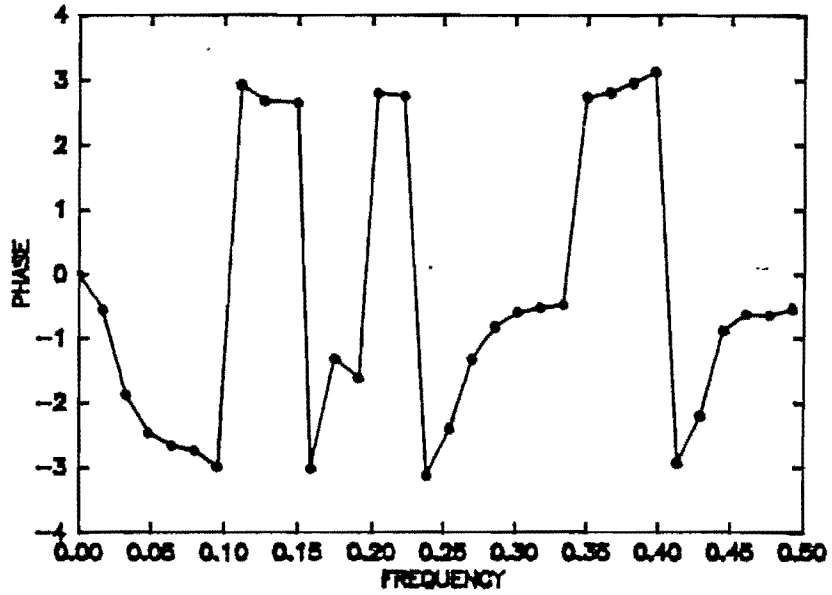
Figure 5.3:



Key for the following eight graphs:

_____ alcohol

-------- symptoms



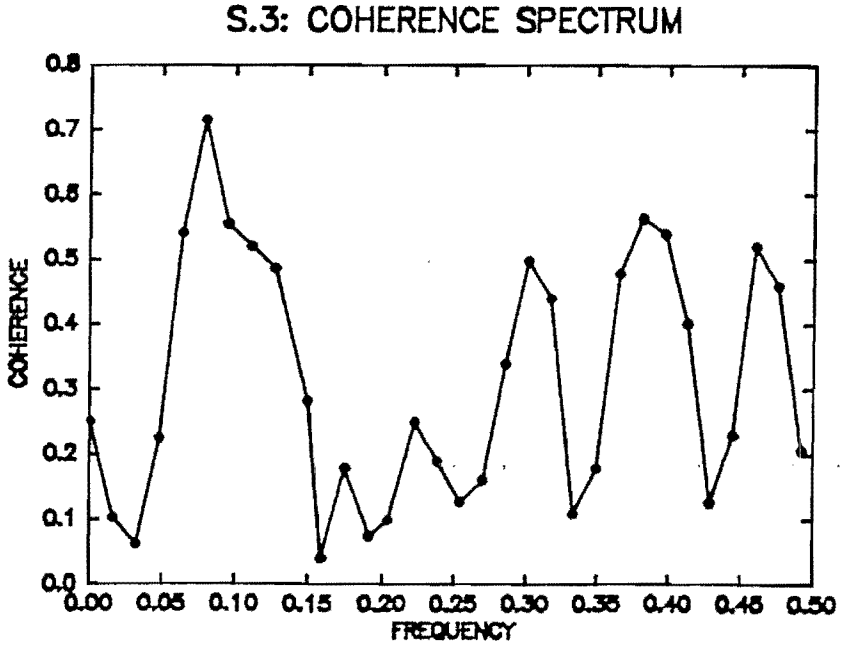
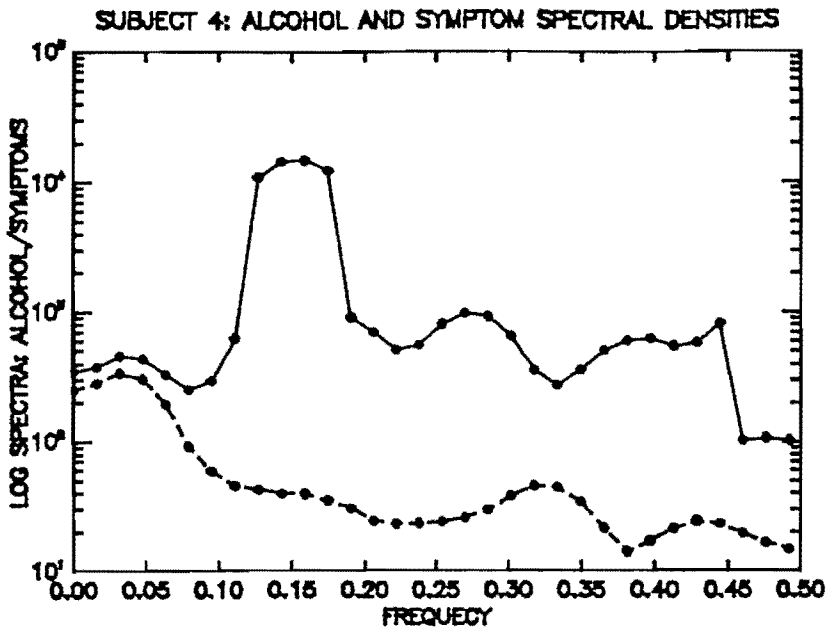
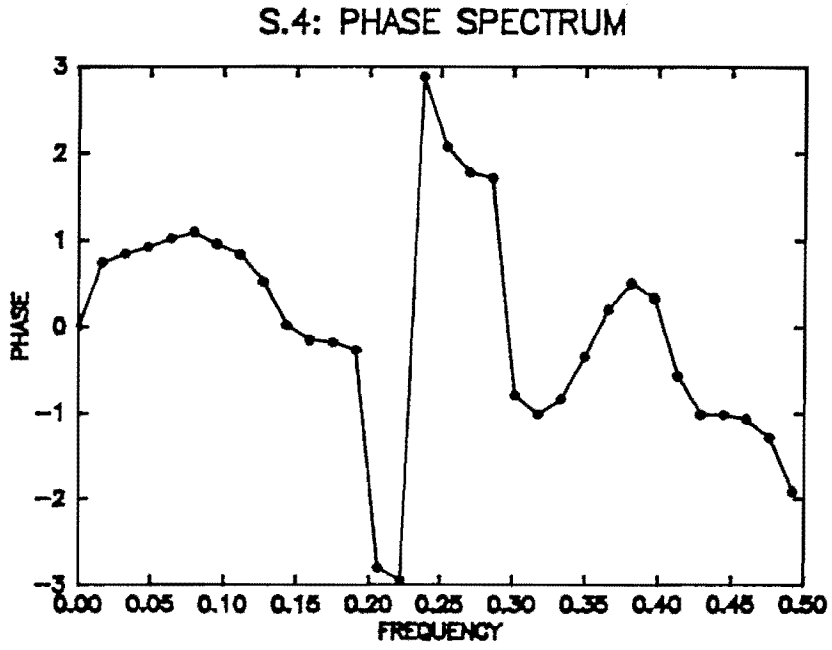
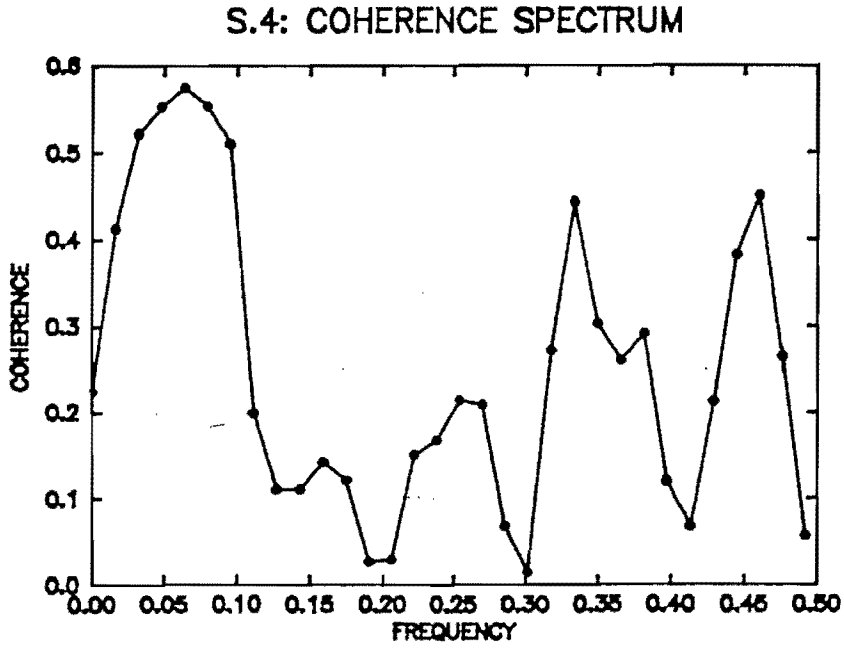


Figure 5.4:


SUBJECT 4: ALCOHOL AND SYMPTOM SPECTRAL DENSITIES
LOG SPECTRA: ALCOHOL/SYMPTOMS
FREQUECY


S.4: PHASE SPECTRUM
PHASE
FREQUENCY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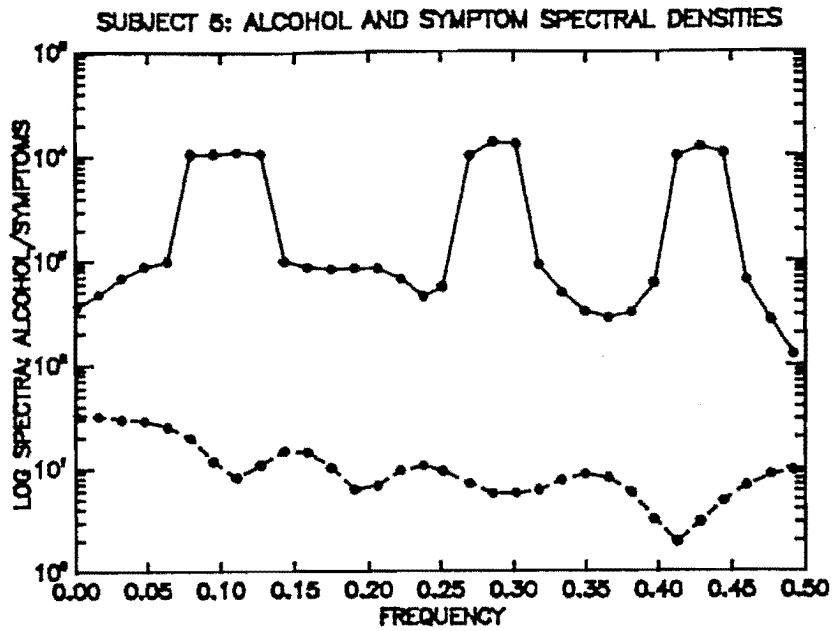
COHERENCE
FREQUENCY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LOG SPECTRA: ALCOHOL/SYMPTOMS
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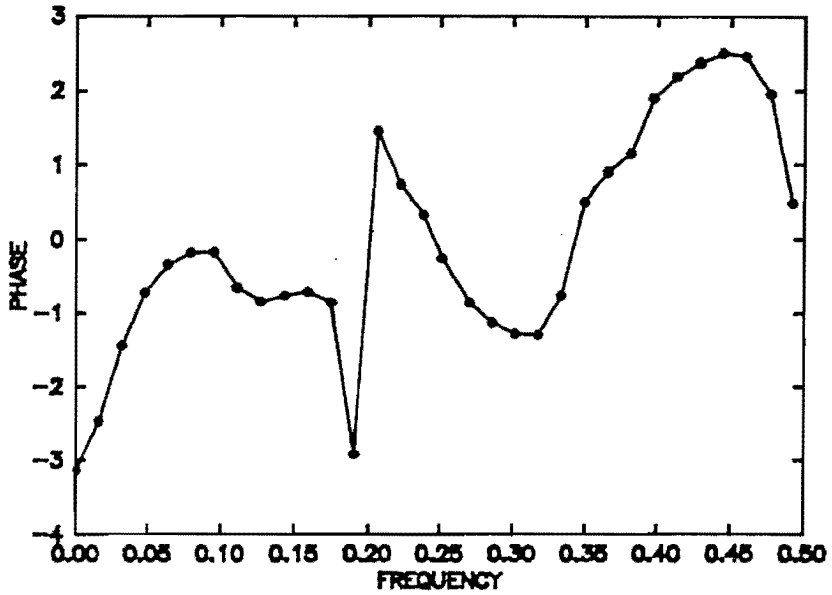
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PHASE
FREQUENCY

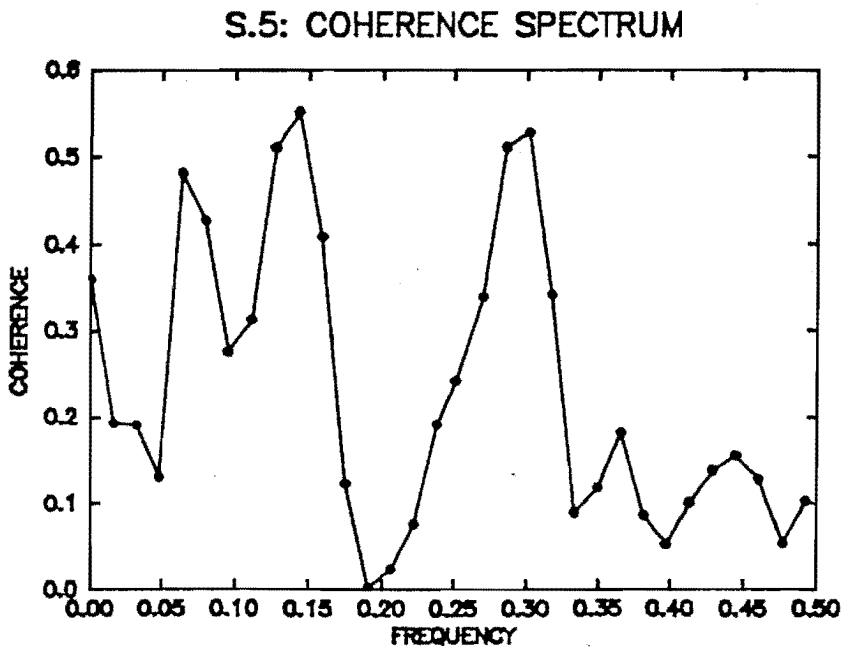
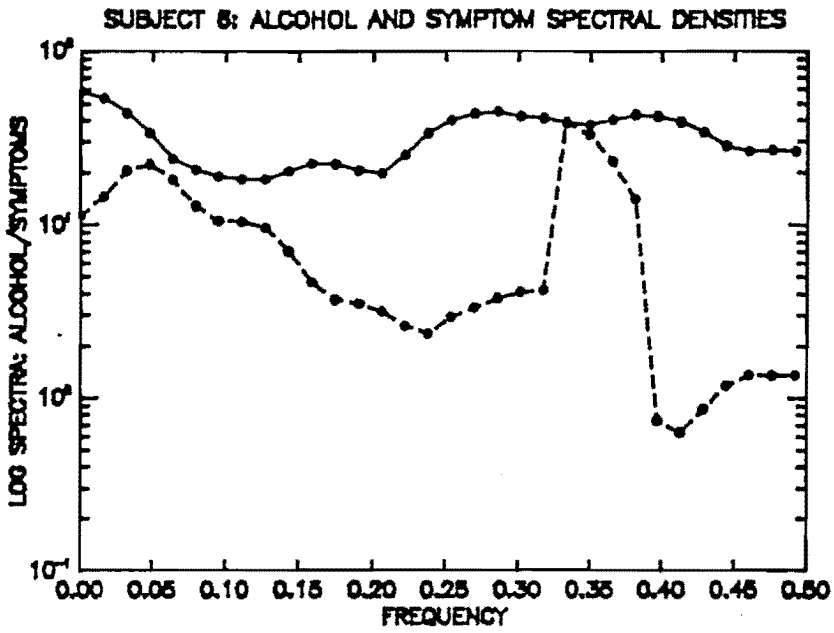
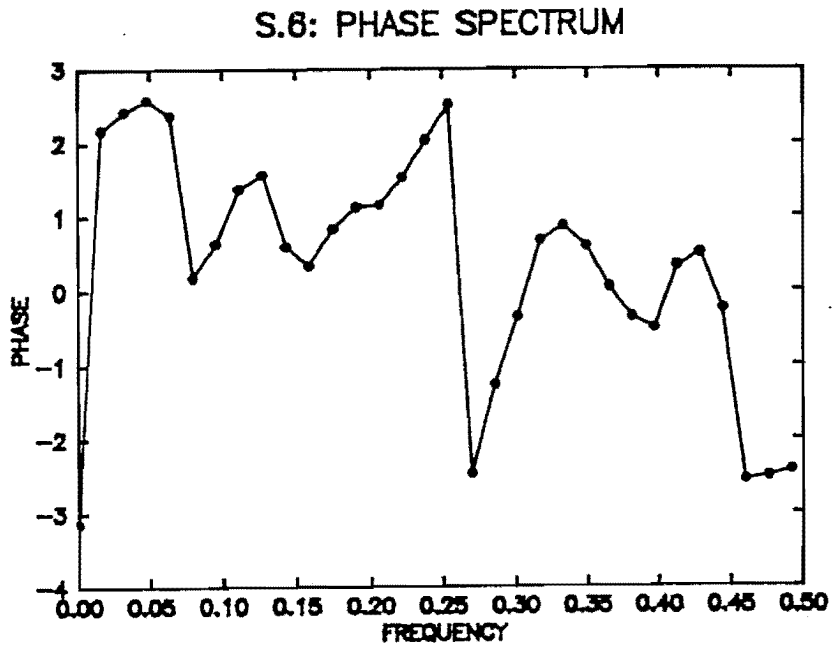
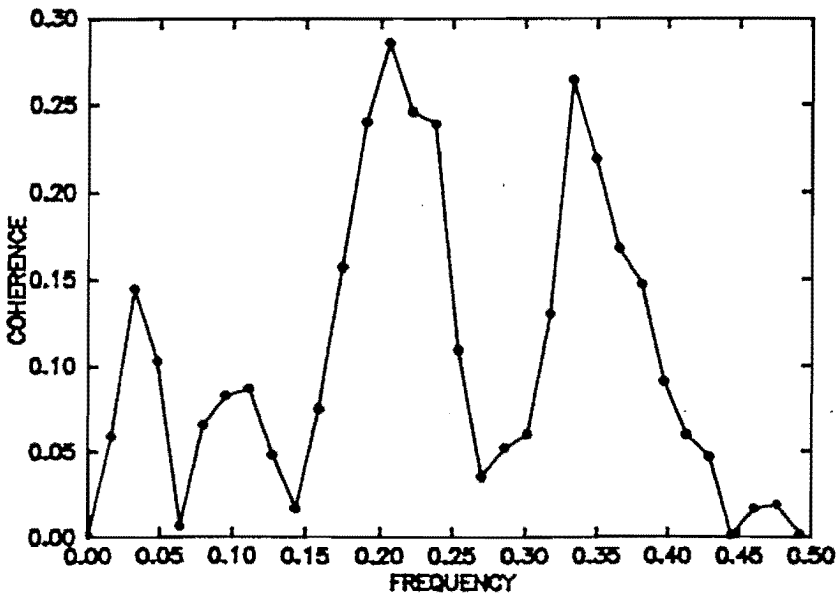
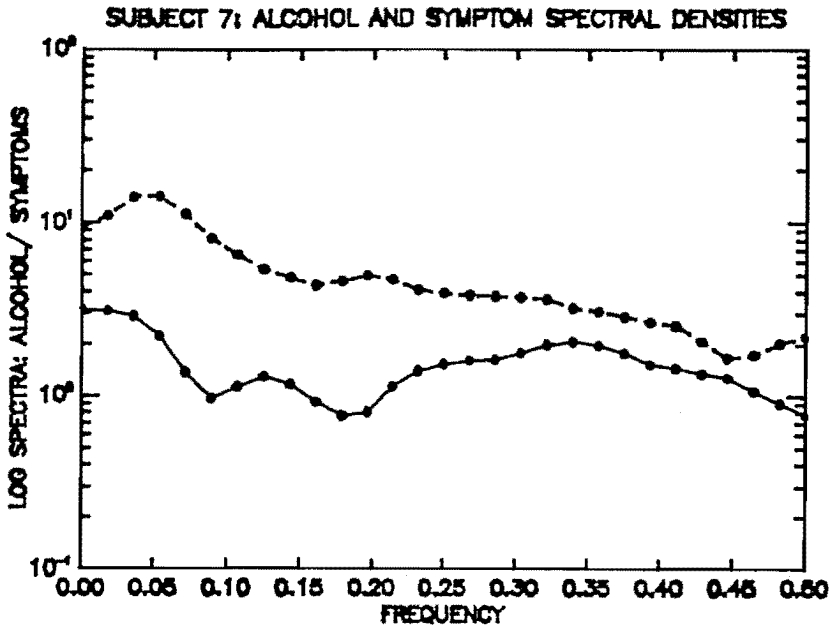

S.5: COHERENCE SPECTRUM
COHERENCE
FREQUENCY

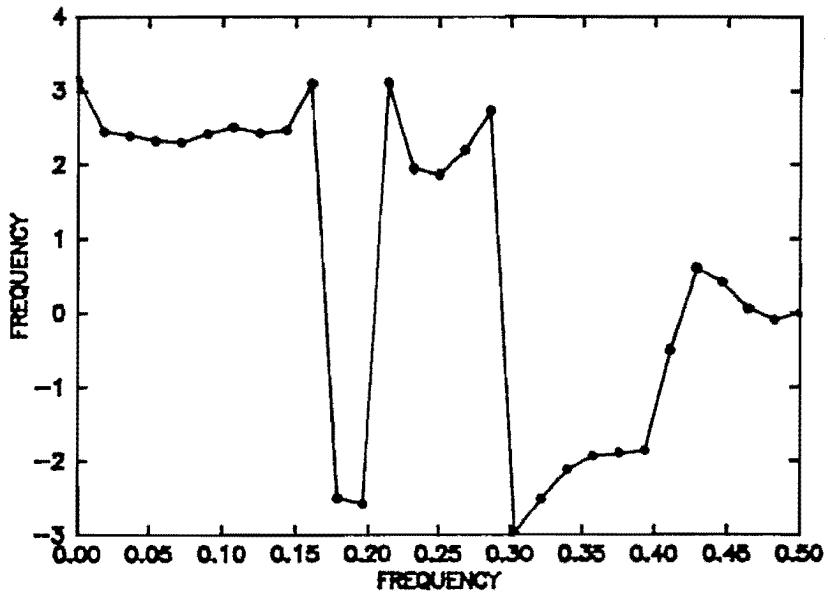
Figure 5.6:


SUBJECT 6: ALCOHOL AND SYMPTOM SPECTRAL DENSITIES
LOG SPECTRA: ALCOHOL/SYMPTOMS
FREQUENCY


S.6: PHASE SPECTRUM
PHASE
FREQUENCY


S.6: COHERENCE SPECTRUM
COHERENCE
FREQUENCY


SUBJECT 7: ALCOHOL AND SYMPTOM SPECTRAL DENSITIES
LOG SPECTRA: ALCOHOL/ SYMPTOMS
FREQUENCY


S.7: PHASE SPECTRUM
FREQUENCY
FREQUENCY

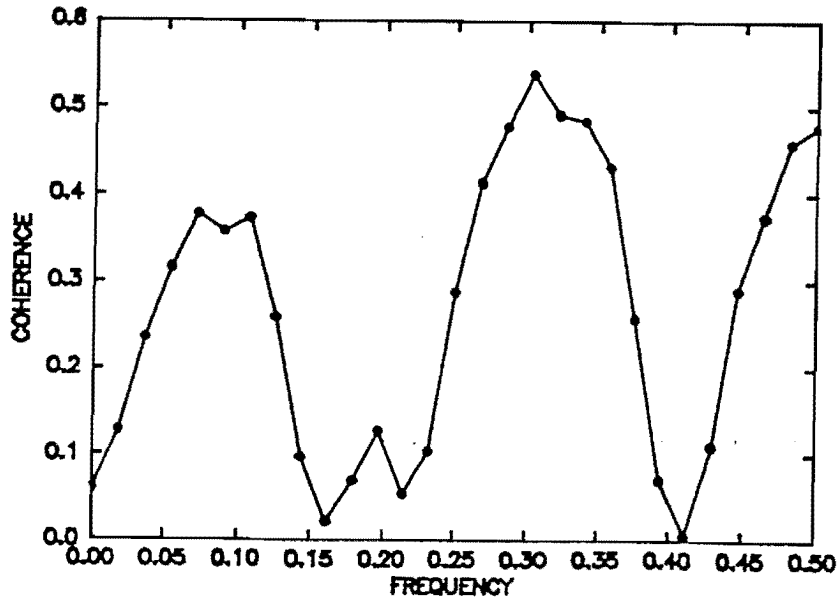
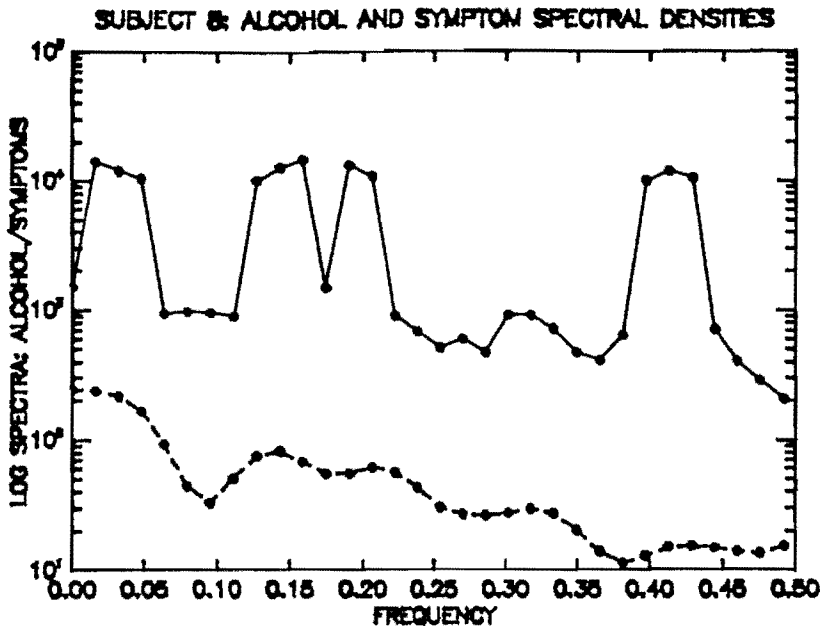
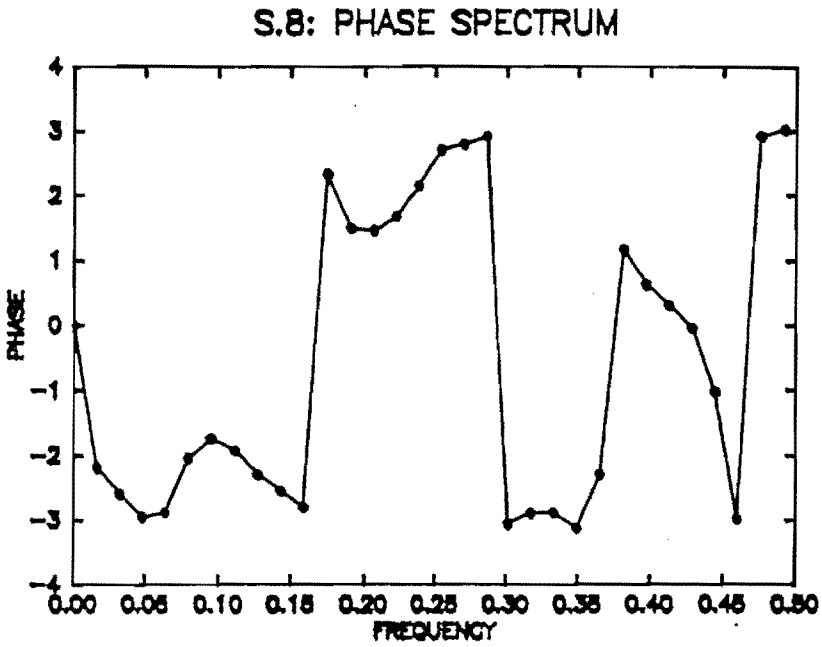
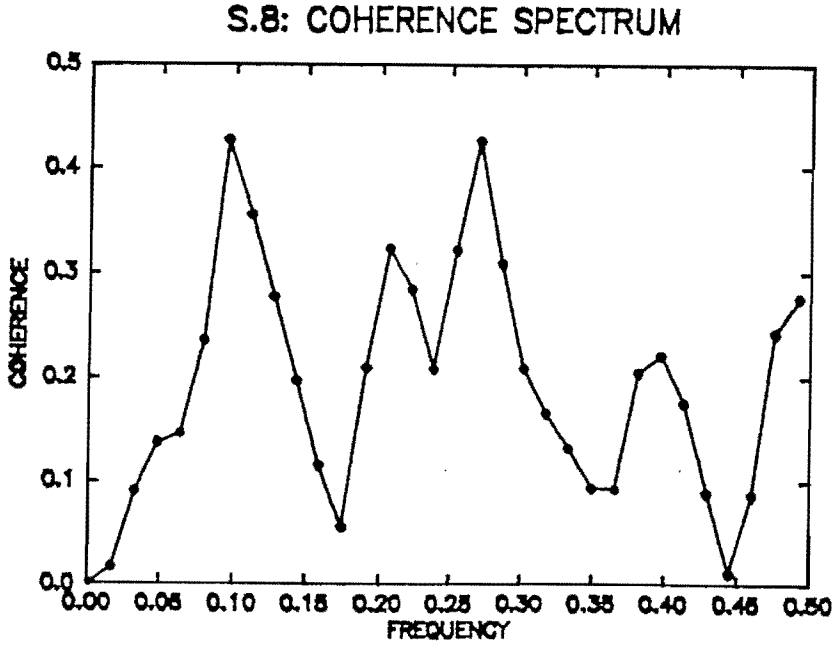
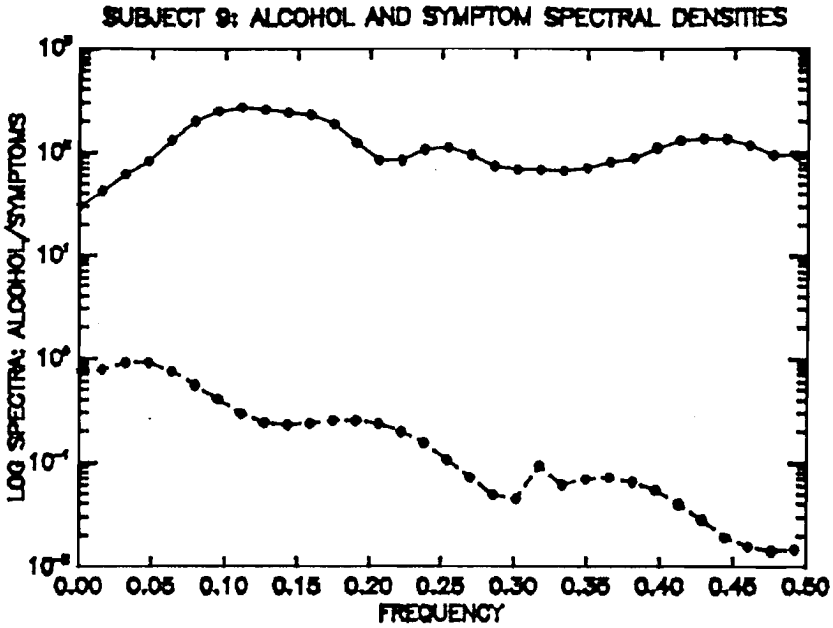

S.7: COHERENCE SPECTRUM
COHERENCE
FREQUENCY

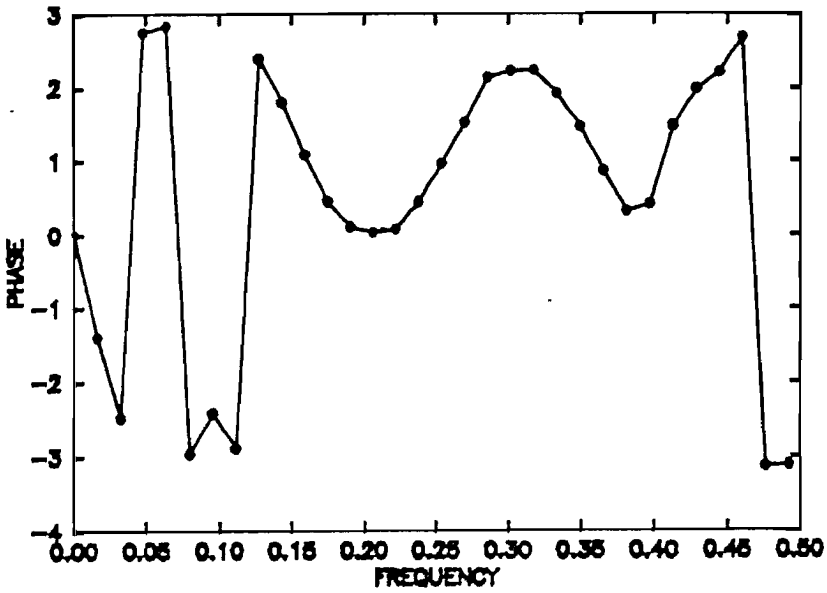
Figure 5.8:


SUBJECT 8: ALCOHOL AND SYMPTOM SPECTRAL DENSITIES
LOG SPECTRA: ALCOHOL/SYMPTOMS
FREQUENCY


S.8: PHASE SPECTRUM
PHASE
FREQUENCY


S.8: COHERENCE SPECTRUM
COHERENCE
FREQUENCY


SUBJECT 9: ALCOHOL AND SYMPTOM SPECTRAL DENSITIES
LOG SPECTRA: ALCOHOL/SYMPTOMS
FREQUENCY


S.9: PHASE SPECTRUM
PHASE
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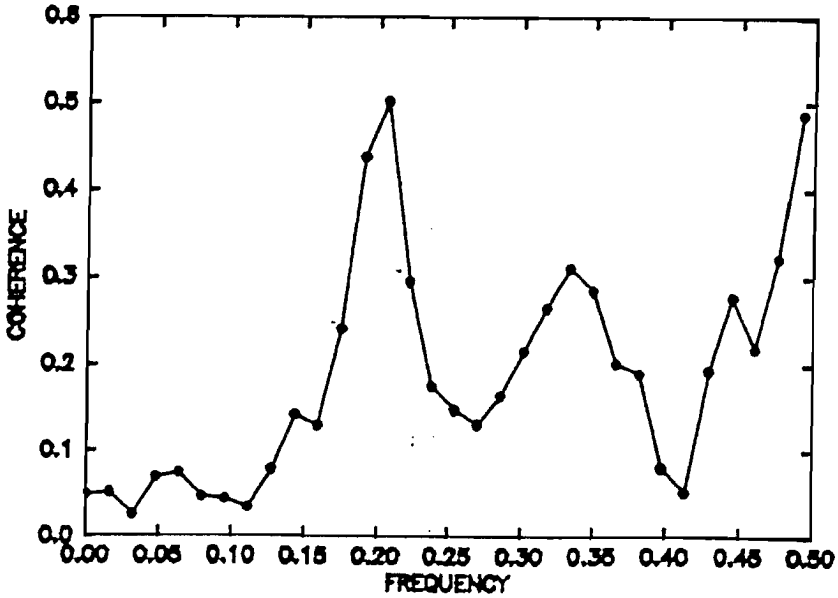
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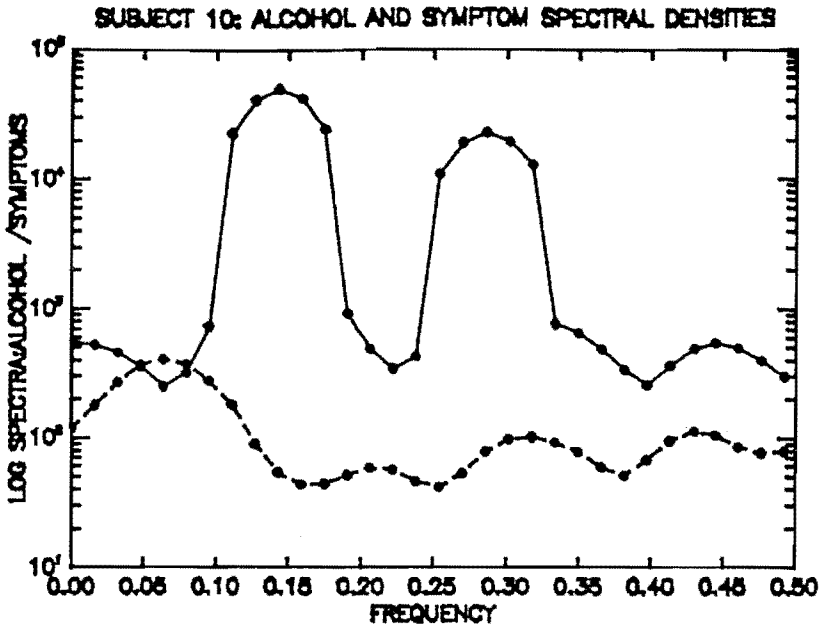
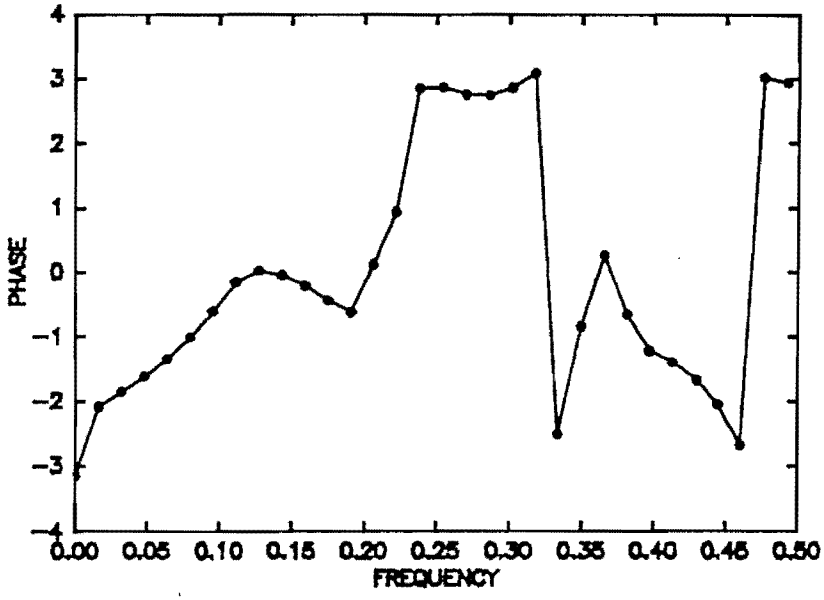
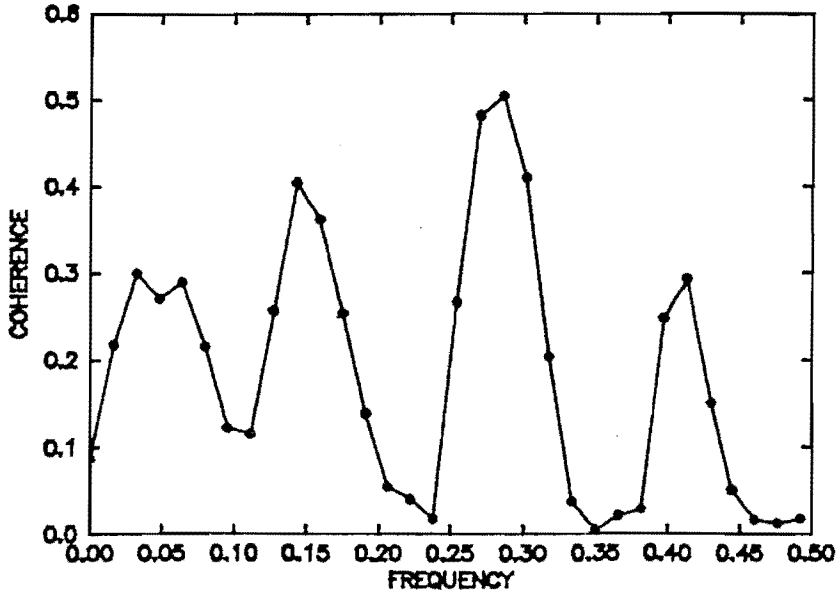


S.10: PHASE SPECTRUM



S.10: COHERENCE SPECTRUM



brief review of time series analysis, the statistical procedure used in this study. Spectral densities with coherence and phase spectra for each subject are illustrated in Fig. 5.3 to 5.10.

The spectral densities for these two variables show a white noise effect, i.e. lines do not follow the same broad outline. However where each variable line is examined independently, alcohol tends to cycle faster, peaking at a frequency of .150 or 6 day intervals while symptom spectral density peaks at .0317 - .0476 or 21-31 day frequency. This is an average menstrual cycle length.

Coherence, the measure of linear association between two variables is moderately high for subjects 3, 4, and 7 at the lower frequencies. Coherence at such frequency contributes little to the variance of the two series. Nonetheless examining the phase spectrum suggests that there may be a general linear trend throughout the phase spectrum. This is indicated by parallel lines. From the slope of these lines it can be concluded that although most of the variation in these series involves autocorrelation the negative slope of the phase spectrum indicates a lead - lag relationship of alcohol to symptoms.

In summary then this bivariate analysis indicates no clear alcohol intake response to experiencing premenstrual symptoms. No data for any subject is strong enough to support this hypothesis. There is however evidence that symptoms specific to PMS become more marked at 21-31 days cycles, confirming a premenstrual syndrome in these subjects. Coherence is generally low. A common feature of this data is that alcohol cycles faster than symptoms i.e. spectral

Table 5.7: ANOVA Summary Table.

ANOVA on cycle and phase of cycle for dependent variable mood.

Source	SS	DF	MS	F	P	
Mood x cycle	26.741	1	26.741	.40	.5424	N.S.
error	528.593	8	66.074			
Mood x phase	481.815	2	240.907	1.88	.1840	N.S.
error	2044.852	16	127.803			
Mood x cycle x phase	196.259	2	98.130	2.15	.1490	N.S.
error	730.407	16	45.650			

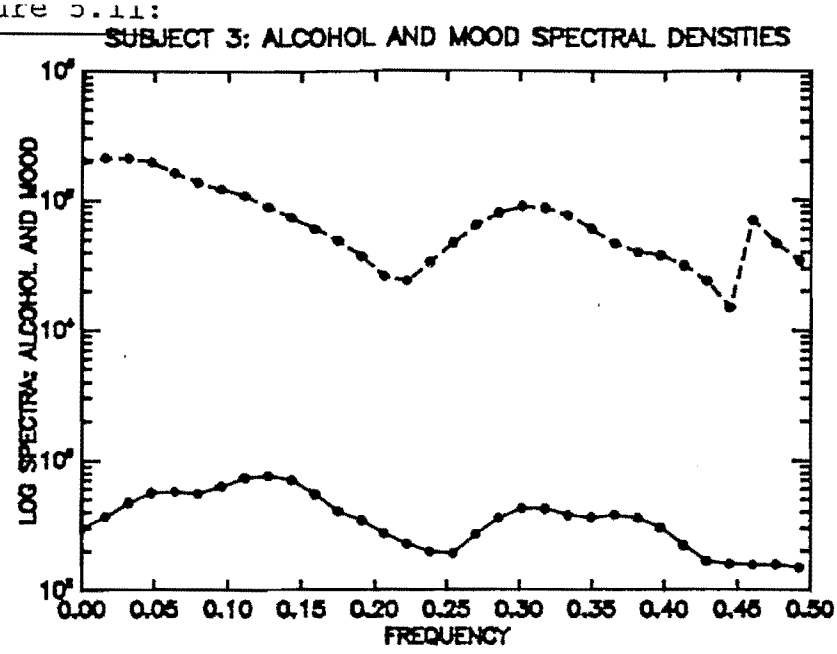
Table 5.8: ANOVA Summary Table.

ANOVA on cycle and phase of cycle for dependent variable affect.

Source	SS	DF	MS	F	P
Affect x cycle	0.1667	1	0.1667	.07	.7978 N.S.
error	19.000	8	2.37500		
Affect x phase	7.70370	2	3.85185	3.63	.05 *
error	16.96296	16	1.06019		
Affect x cycle x phase	0.4444	2	0.2222	0.12	.885 N.S.
error	28.88889	16	1.80556		

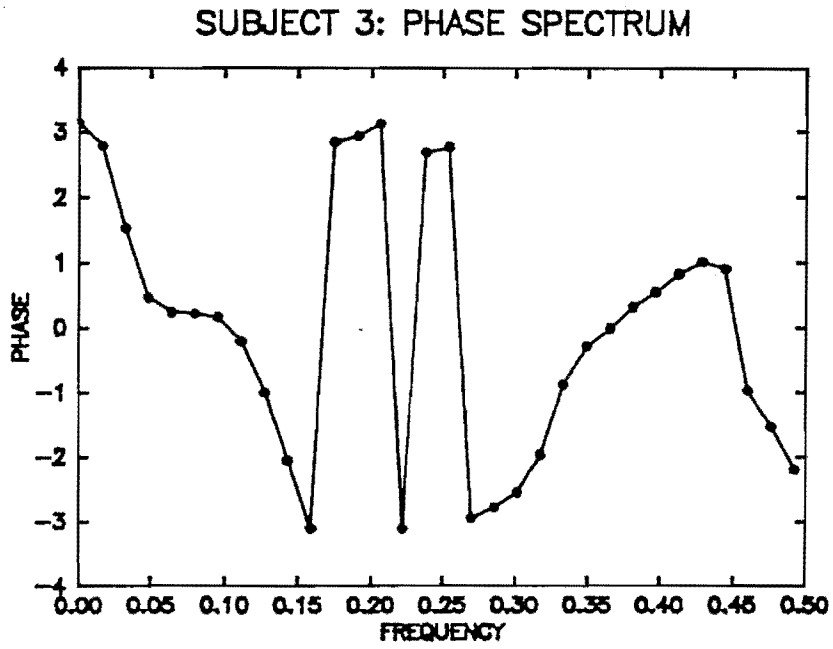
* Significant.

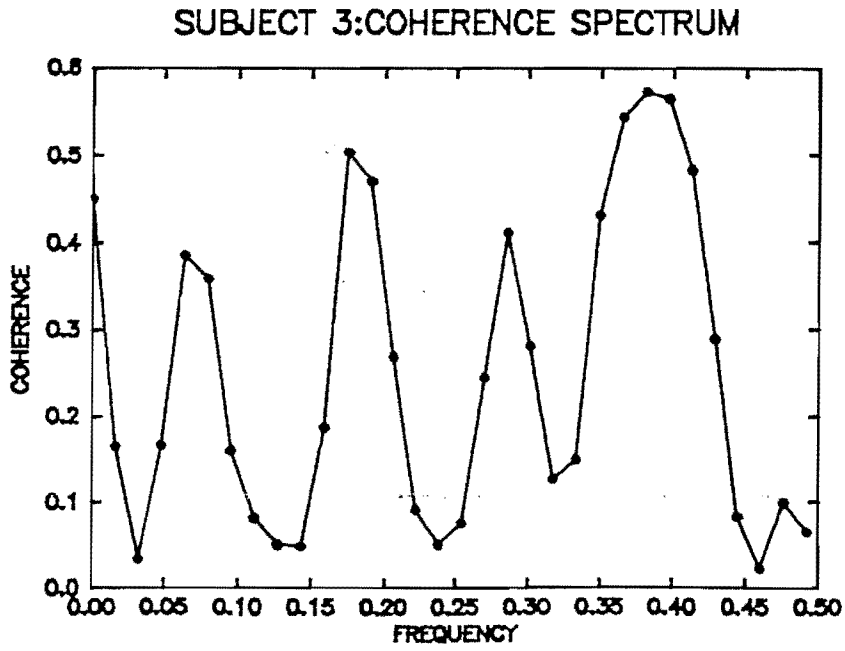
Figure 5.11:



Key for the following eight graphs:

--------- mood
_____ alcohol





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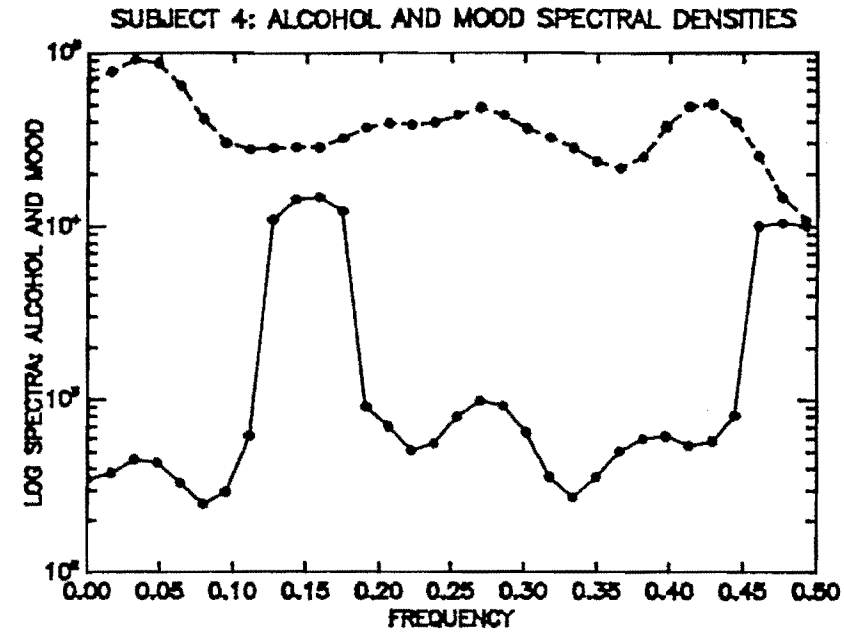
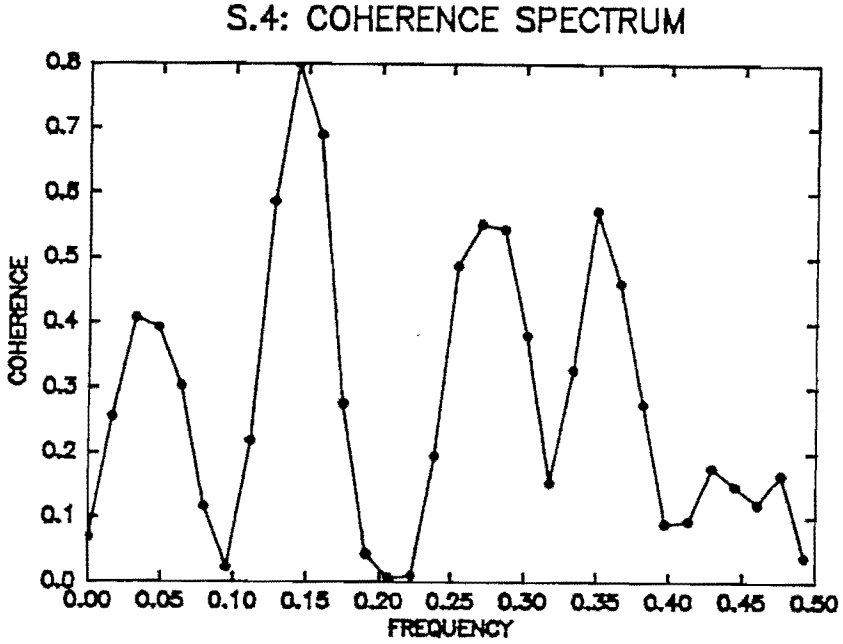
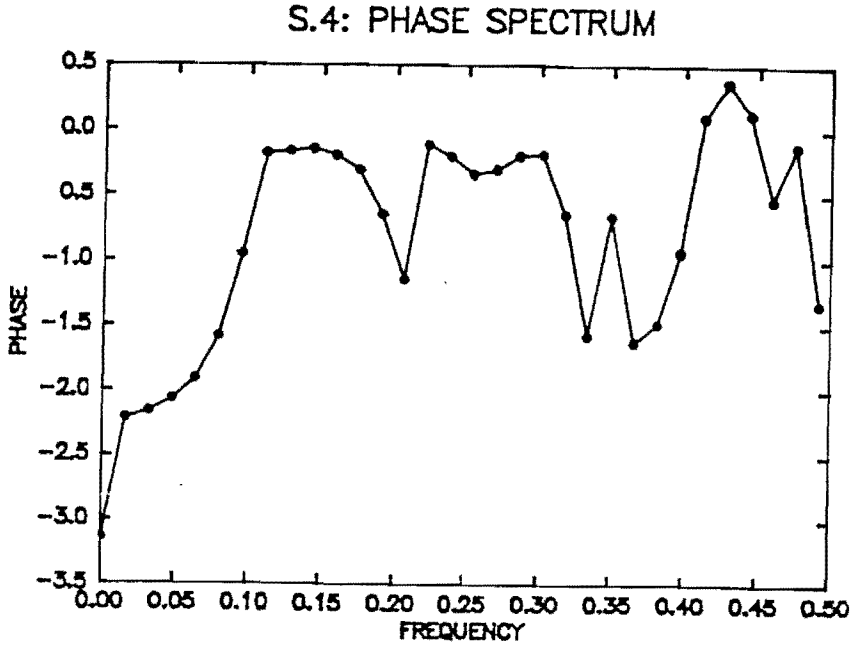
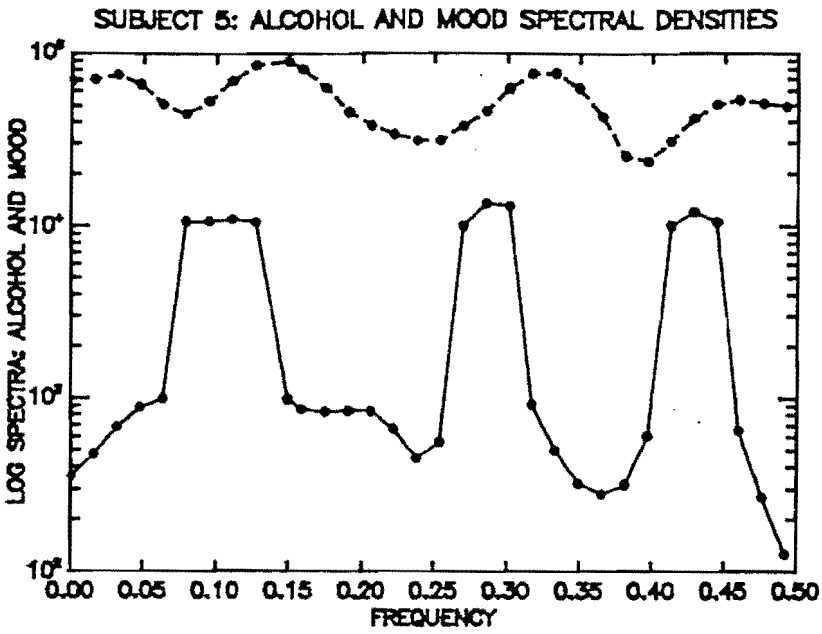

SUBJECT 4: ALCOHOL AND MOOD SPECTRAL DENSITIES
LOG SPECTRA: ALCOHOL AND MOOD
FREQUENCY


S.4: COHERENCE SPECTRUM
COHERENCE
FREQUENCY


S.4: PHASE SPECTRUM
PHASE
FREQUENCY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LOG SPECTRA: ALCOHOL AND MOOD
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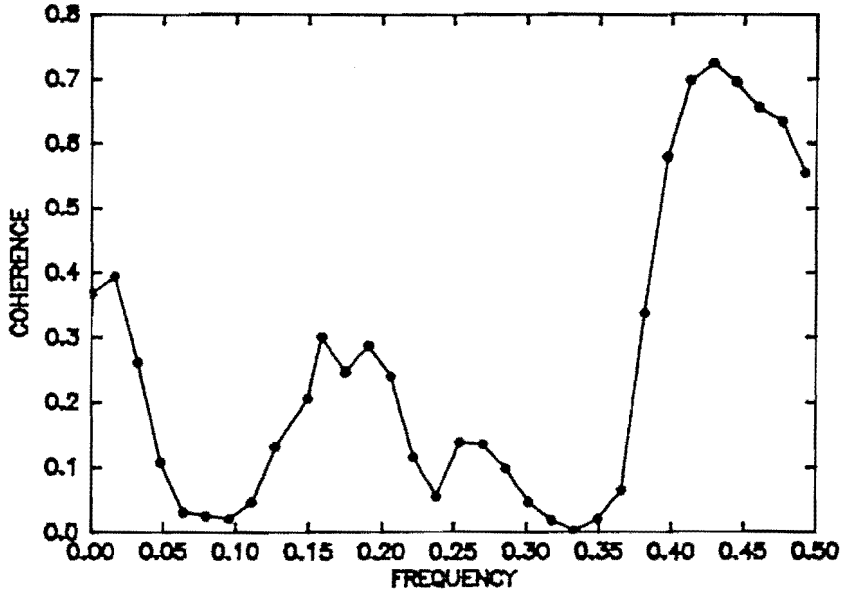
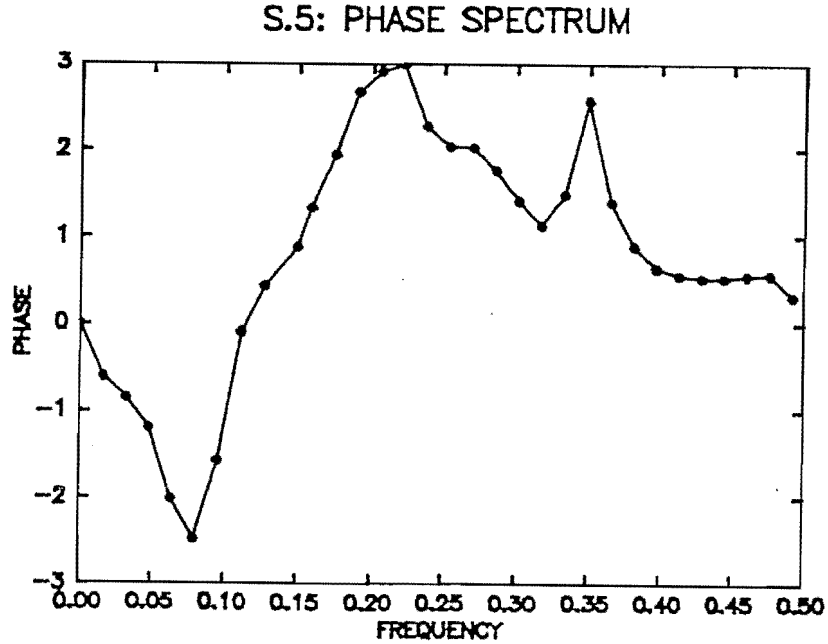

S.5: COHERENCE SPECTRUM
COHERENCE
FREQUENCY


S.5: PHASE SPECTRUM
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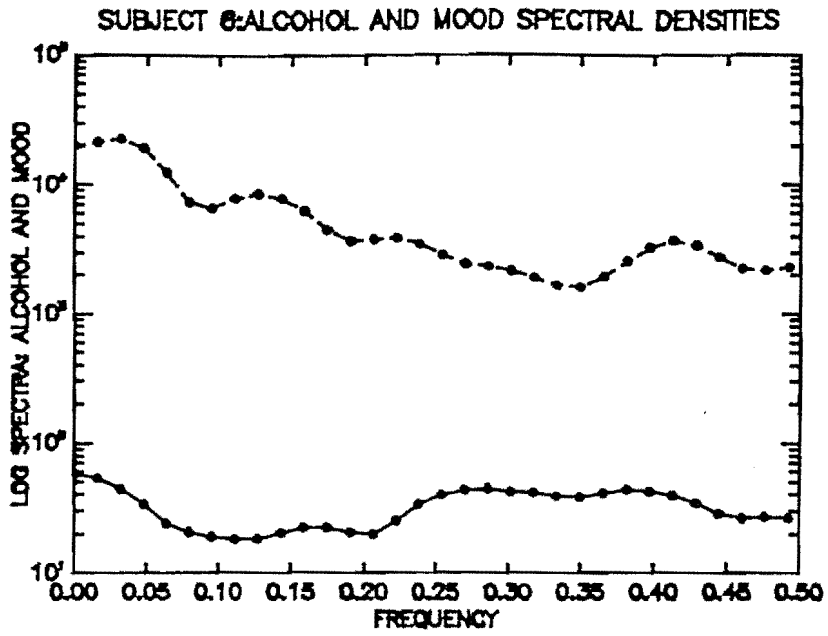

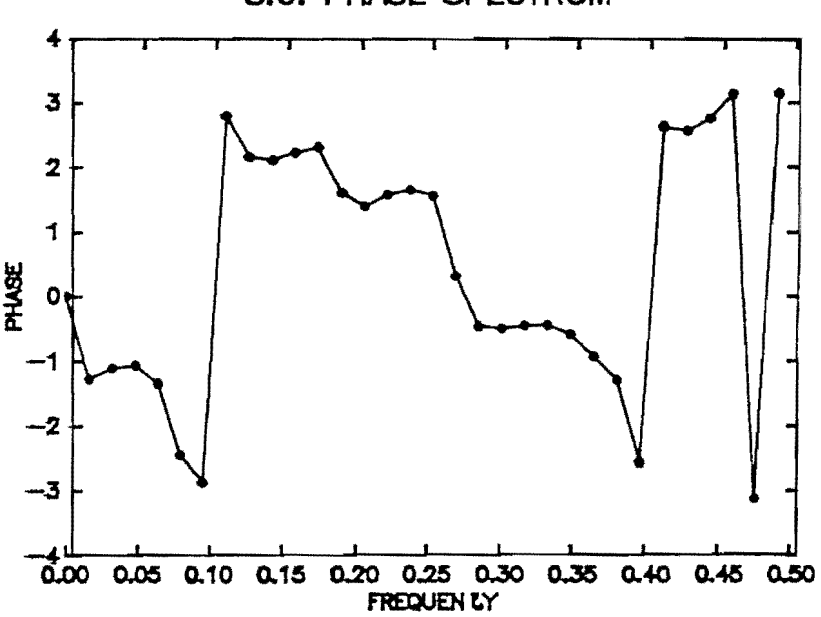

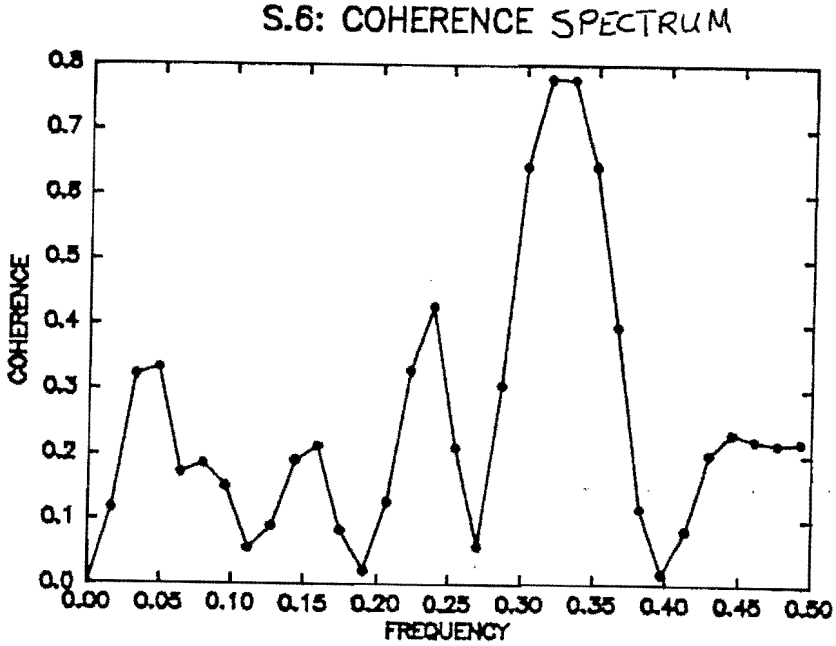

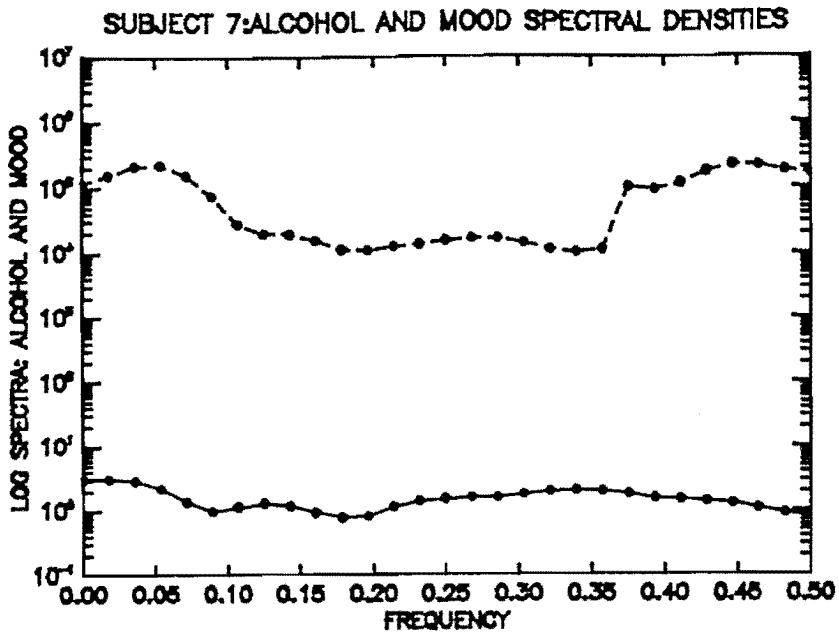
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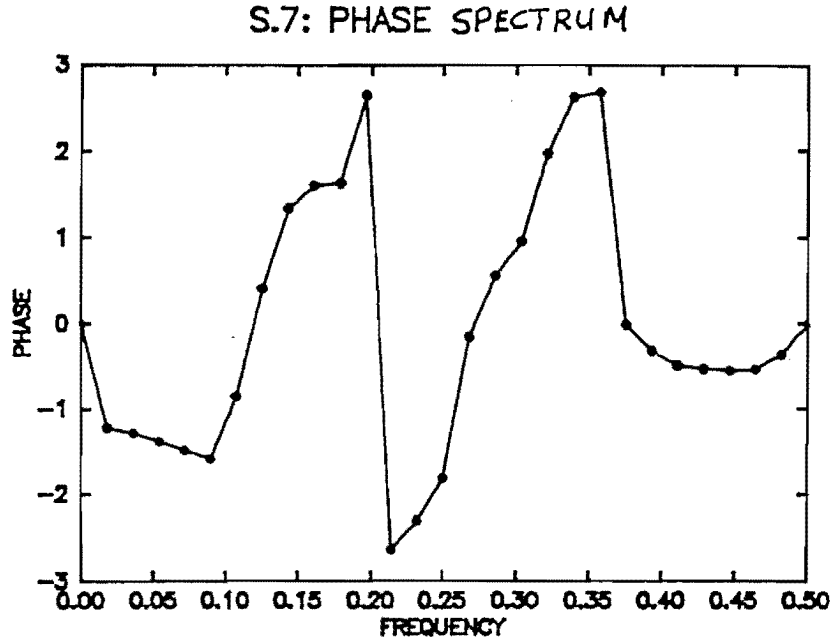
LOG SPECTRA: ALCOHOL AND MOOD
FREQUENCY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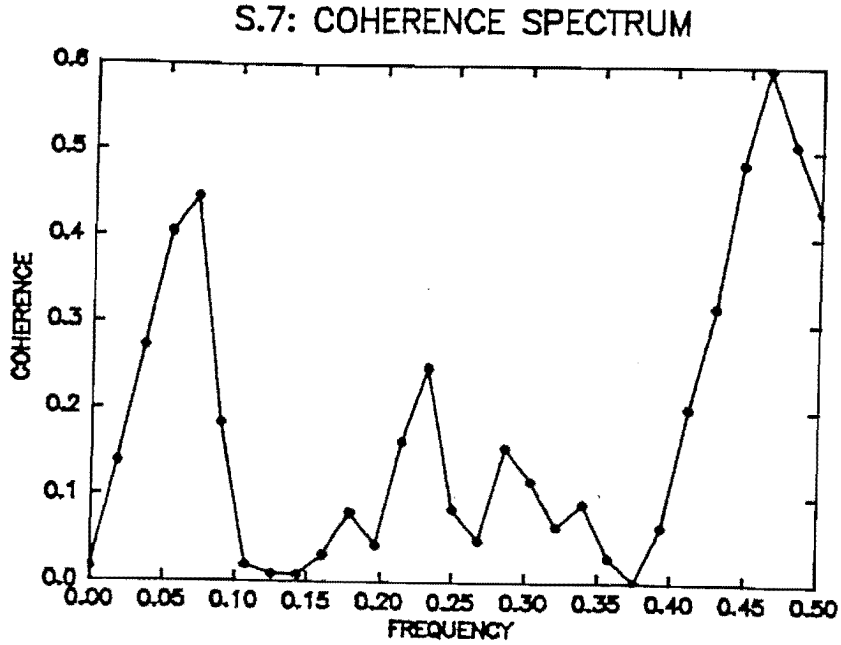
FREQUENCY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COHERENCE
FREQUENCY

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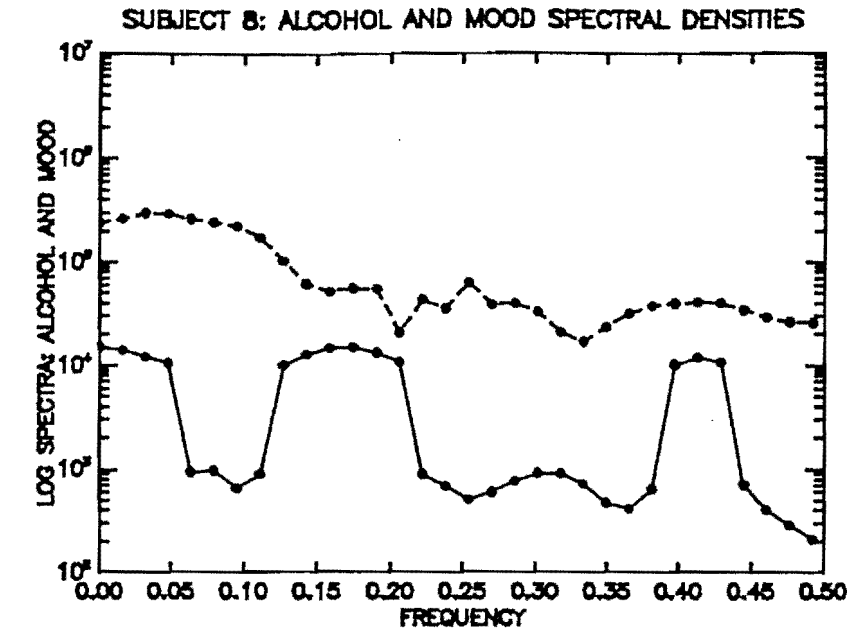
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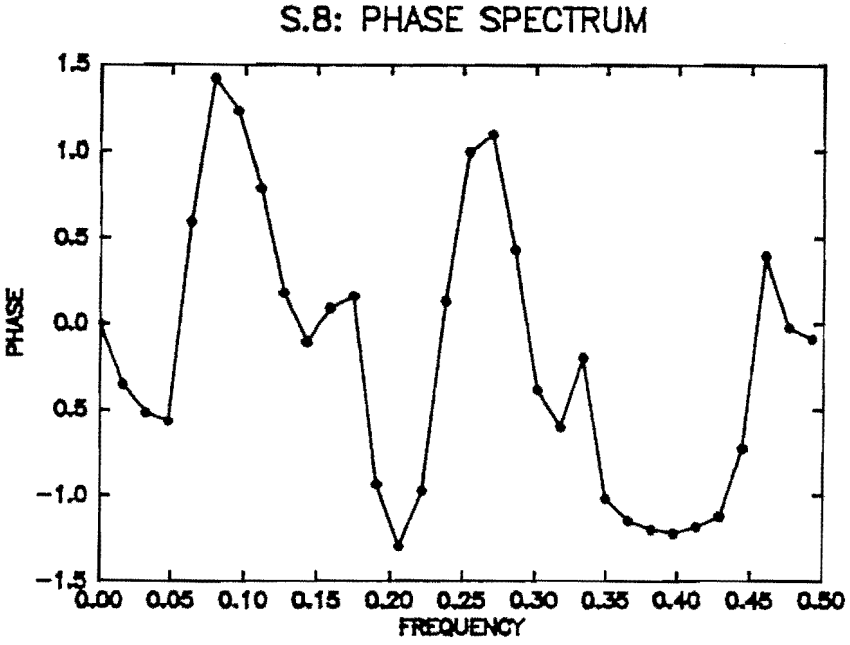
LOG SPECTRA: ALCOHOL AND MOOD
FREQUENCY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PHASE
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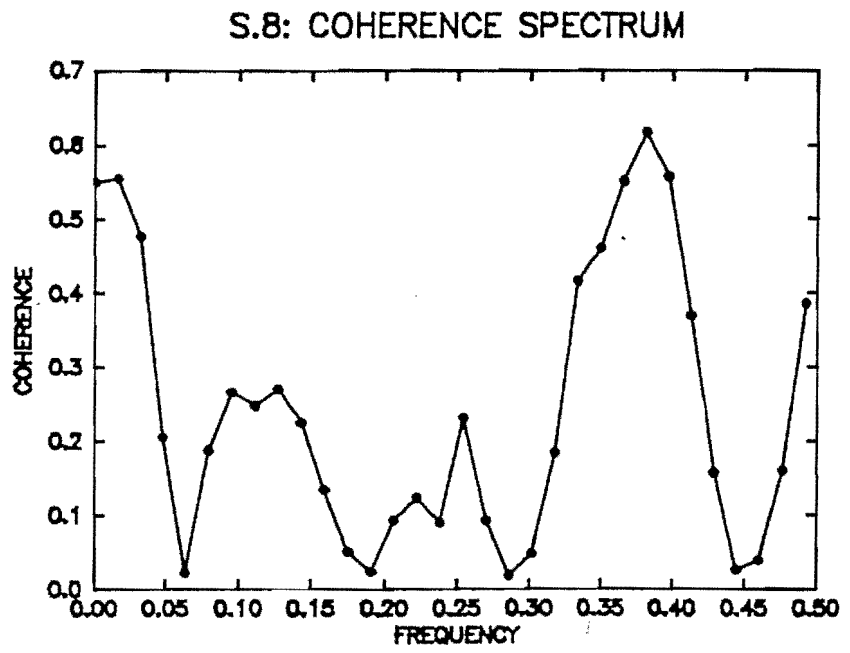
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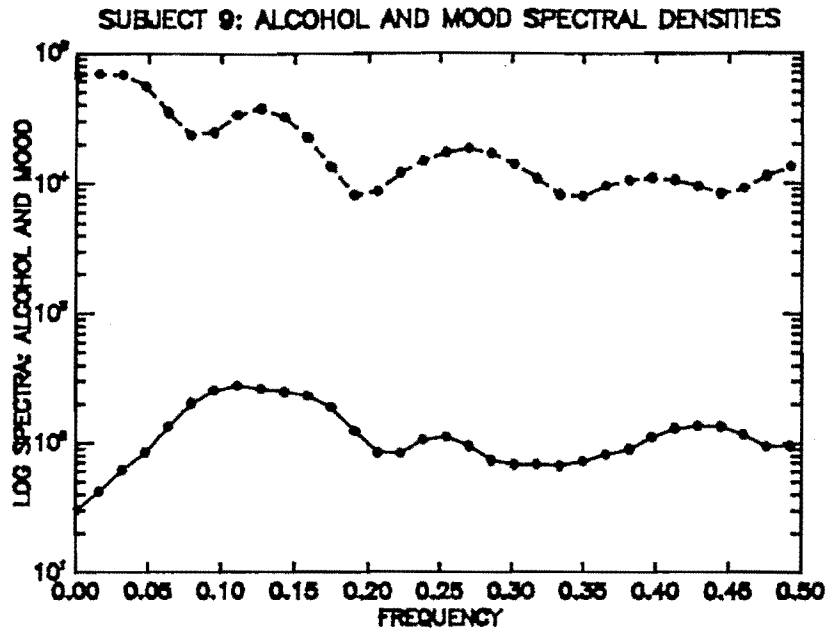
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LOG SPECTRA: ALCOHOL AND MOOD
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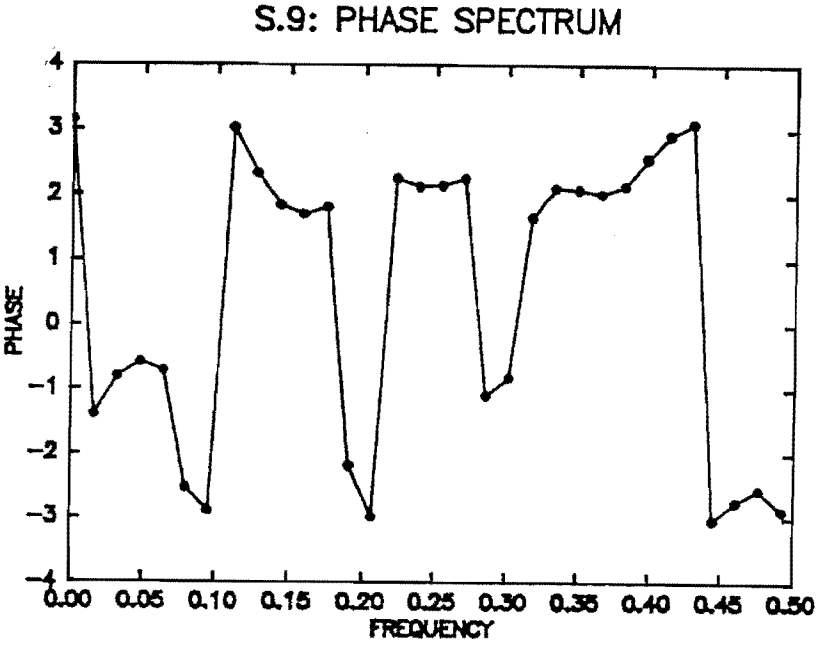
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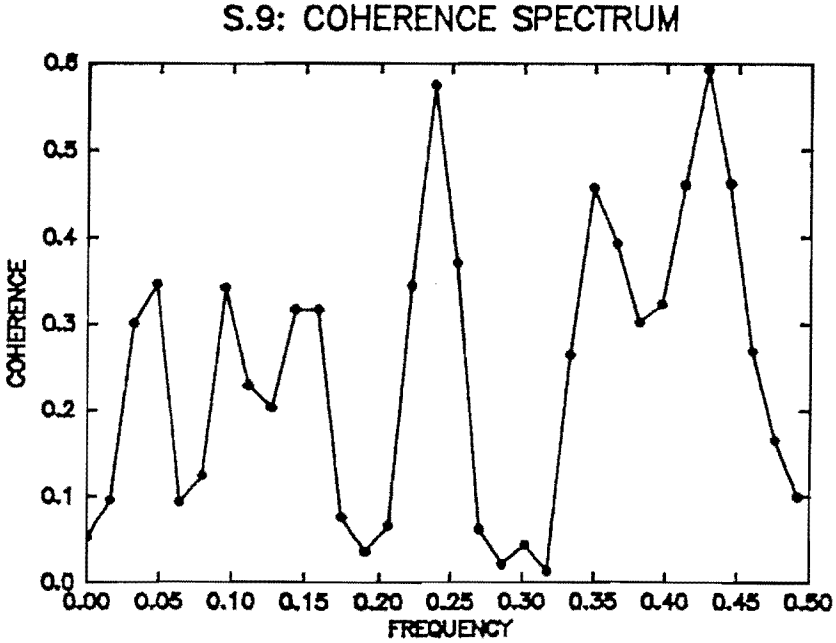
PHASE
FREQUENCY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COHERENCE
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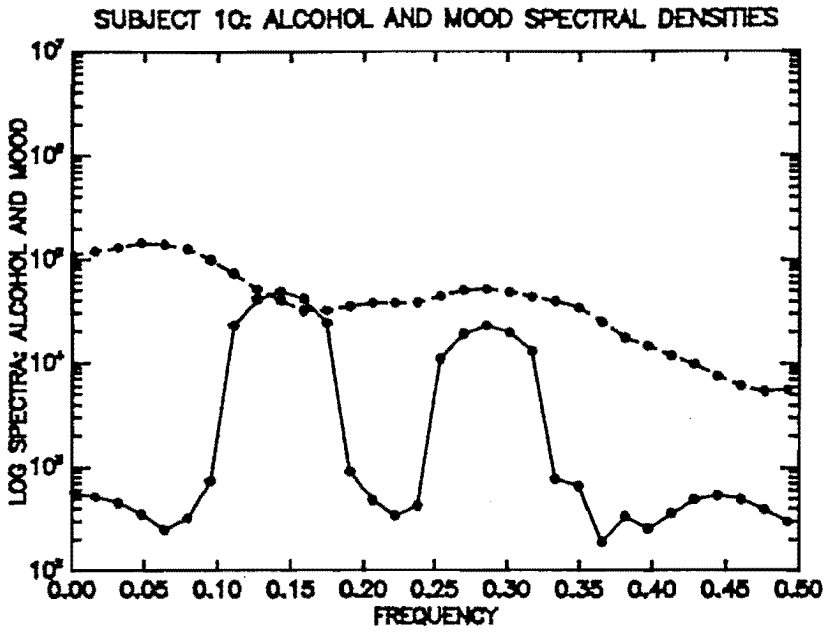
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FREQUENCY
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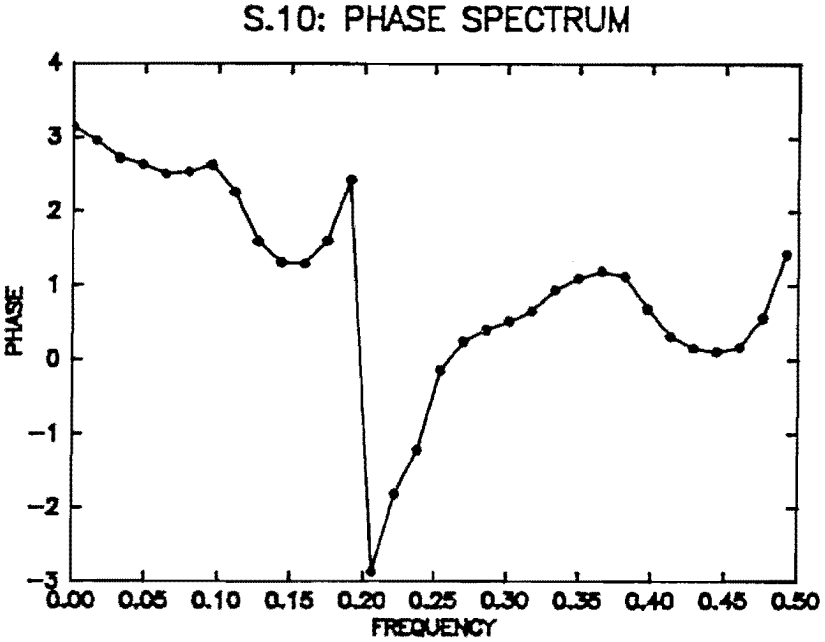
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PHASE
FREQUENCY
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−2
−3
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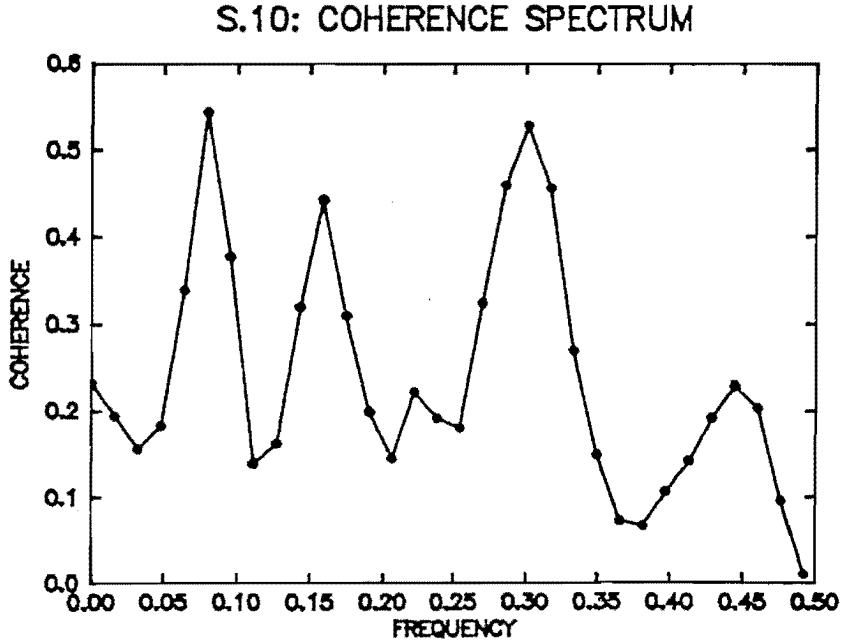
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COHERENCE
FREQUENCY
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0.3
0.2
0.1
0.0
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50

densities peak faster on the variable alcohol intake at a frequency of .020 or 5-7 days, suggesting a weekly perhaps a weekend pattern of increased alcohol intake. Furthermore that symptoms peak with alcohol intake in this series may again be more a result of auto correlation than cross correlation.

The third hypothesis states that there is a significant variation in mood particularly dysphoria in the premenstruum and women drink to alleviate this symptom.

An ANOVA was performed on mood with cycle phase. A summary of the ANOVA results are shown in Table 5.7. The main effect of cycle on mood was insignificant (F (1) .40 - p.542 as was the main effect phase, on mood(F (2) 1.88 - p.1840). And finally the interaction phase x cycle x mood was also insignificant (F (2) 2.15 - p.1490). This indicates mood as recorded by visual analogue scale shows no significant variance between phases for this group of women.

However when an ANOVA was performed with negative affect as the dependent variable (one cluster of symptoms taken from the MDQ) a main effect of phase on affect was found, (F (2) 3.6371 p.05). Table 5.8 shows a summary of these results. However the main effect of cycle for affect was insignificant(F (1) .07 - p.7978)as was the interaction affect x cycle x phase (F (Z) 0.12 - .8850).

A bivariate analysis for variables alcohol intake and mood with coherence and phase spectrums are graphed in Fig. 5.11 - 5.18.

Subjects 3 and 4 demonstrate a moderate mood/alcohol relationship. The spectral densities for subject 3 (Fig. 5.11) follow the same broad outline. A moderate coherence of .5

at a frequency of .17 or 5-8 days with a positive slope in the phase spectrum at the same frequency suggests a lead - lag relationship mood to alcohol intake. That is mood tends to be the antecedent to alcohol intake for this subject. A review of this subject's daily diary indicates social events e.g. 2 family deaths and several people staying, occurred, during the two months the study took place. It may well be that mood and alcohol are most related to these events and not the menstrual phase of the cycle.

Subject 4 also shows a similar spectral density outlines (Fig. 5-12) mood variation coincides with alcohol intake. A coherence of .8 at a frequency of .14 or 7.4 days indicates a good measure of linear association. The phase spectrum gives a ratio close to zero at the same frequency, suggesting the variables tend to be synchronous but with the subtle positive slope mood is the antecedent to alcohol intake in this subject.

In summary this bivariate analysis indicates that for two subjects a relationship between dysphoric mood and alcohol exists. Dysphoric mood tends to be the antecendent to alcohol intake. It is not clear whether the dysphoria is a result of alcohol intake or premenstrual like symptoms. It is noteworthy that subject 4 is younger and drinks more alcohol per occasion on fewer occasions than most other subjects (Table 5.1).

Overall it is curious to find a main effect for negative affect/phase of cycle and not mood/phase of cycle. This may reflect a difference in the two reporting modes of the study. One is the analogue scale for mood and the other is the MDQ symptom-specific scale related to dysphoria is

very narrow.

To discover if the two variables mood and daily MDQ symptom score have any coherence a bivariate analysis was performed. However as the symptoms score was a total score made up from a physiological symptom score and a negative affect score, two further bivariate analyses were performed: mood with physical symptoms score and mood with negative affect score. Results are tabled in Appendix 12, 13 and 14.

For the bivariate analysis mood/symptoms a very high coherence of .9 was found in subjects 3 and 6. Subjects 4, 6, 7, 8, 10 showed a coherence of .6. These coherences did not coincide with menstrual cycle time span but had a periodic characteristic of 7-12 days. The slope of the phase spectrum at the points of mod-high coherence tends to convey a lead - lag relationship with symptoms leading into mood variance. Subjects 5 and 10 showed no coherence at all.

The coherence measure for the following two analyses are also moderately higher .6 - .8 .However the frequencies vary from 5-30 days. Spectral densities for mood and physiological symptoms follow a more consistent broad outline than mood and negative affect. The positive slope of the phase spectrum for most subjects suggests symptoms whether they be physiological or negative affect are followed by mood variance. Exceptions are subject 10 with a negative phase spectrum at a coherence of .6, and subjects 6 and 7 with negative phase spectrum at a coherence of .7 and .6 respectively. Subject 9 indicates no coherence between any of the two variables analysed. Subject 5 shows no coherence between physiological symptoms and mood.

In summary a strong coherence between mood and

symptoms was found in two subjects, 3 and 6. Most subjects showed a moderate relationship of .6 . Frequencies occurred with a periodic characteristic of 7-12 days, this not coinciding with the 21-28 periodic characteristic of the menstrual cycle. The slope of the phase spectrum in most subjects tended to suggest symptoms whether they be physiological or negative affect, preceeded mood variance. This evidence tends to suggest dysphoric mood is a result of specific symptomatology. The variable mood, condensed from six analogue scales may have diluted this effect. It may also indicate that subjects are most aware of physical symptoms and secondly mood states related to that. The frequency of 7-12 days does coincide with the bivariate analysis for alcohol intake and a weekly pattern is queried. These results indicate there to be a relationship between alcohol intake and mood that occurs at 7-12 day cycles. This is unrelated to the premenstrual phase of the menstrual cycle.

To test the fourth hypothesis that there is a relationship between stress and alcohol consumption an ANOVA and bivariate time series analysis was performed. Stress is a condition that can emanate from within or from the environment (see model p 32). Each subject indicated their level of stress on a daily analogue scale.

The menstrual cycle is a stressful event. The results of the ANOVA with stress as the dependent variable are presented in Table 5.8. There was no main effect for cycle on stress (F (1) 0.04 - p .844) or for phase on stress (F (1) 1.44 - p .267.) There was an interaction stress x cycle x phase (F (2) 3.78 - p.0452.) This interaction may represent more than one phase induces stress, during a cycle.

Table 5.9: ANOVA Summary Table.

ANOVA on cycle and phase of cycle for dependent variable stress

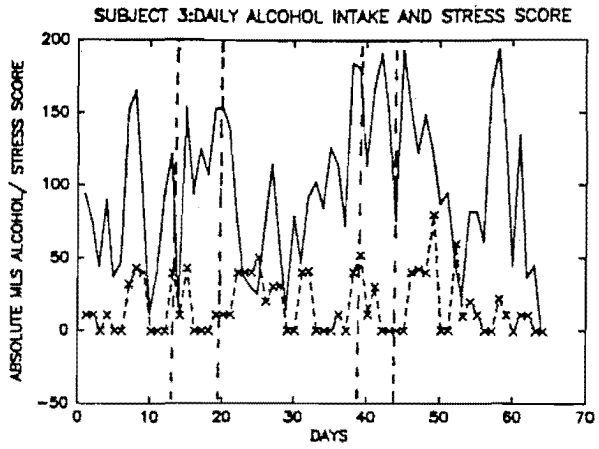
Source	SS	DF	MS	F	P
Stress x cycle	2.2407	1	2.2407	0.04	.844 N.S.
error	436.259	8	54.5324		
Stress x phase	335.2593	2	167.6296	1.44	.267 N.S.
error	1868.4074	16	116.7755		
Stress x cycle x phase	411.7037	2	205.8519	3.78	.0452 *
error	871.2963	16	54.4560		

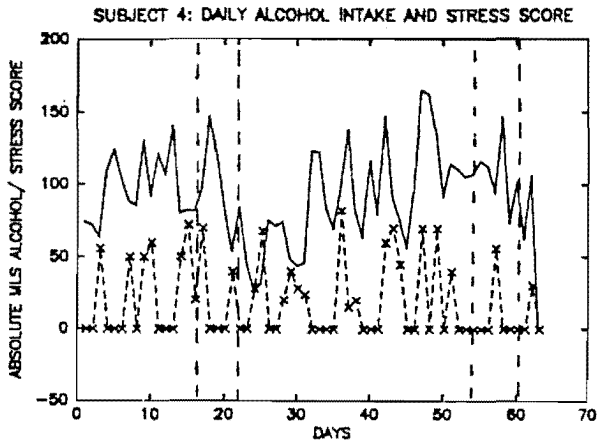
* Significant.

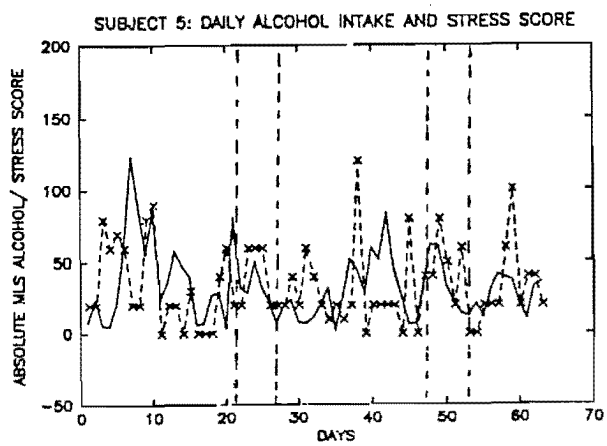
The raw data was graphed, and is presented in Fig. 5.18. This data shows subjects 3, 4, 6, 7 have an increase in stress in the premenstrual phase. The increase does not consistently coincide with increased alcohol intake indicating no obvious relationship between the variables alcohol intake and stress in the premenstrual phase. Only subject 4 records an increase in alcohol intake and stress simultaneously in her second premenstrual phase. The subject confirmed that her drinking was to alleviate PMS symptoms with the statement 'If these symptoms continue I'll become a soak'. A reduction in her physical symptoms always came at menstruation. Subjects 5, 9, 10 all drink in the premenstrual phase but an increased stress score does not coincide in this phase.

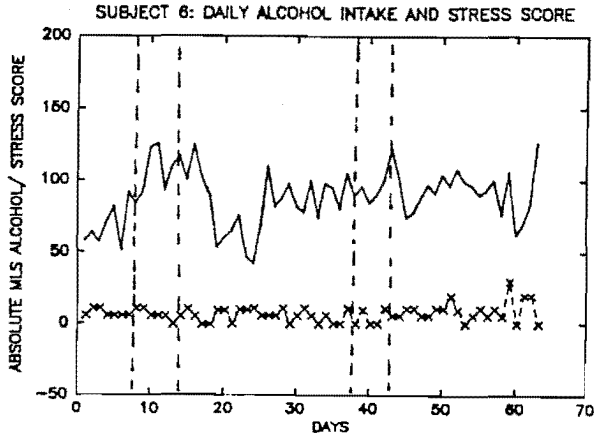
The spectral densities, coherence and phase spectrums for stress and alcohol intake are tabled in Appendix '15'. This data is not graphed. Spectral densities follow a general broad outline for subject 3 only. Other subjects do not reflect such general periodic characteristics. Coherence for each subject is .55 or less. While this occurs at low frequencies, a comment on this phase of the coherence is warranted. With these two variables, these eight subjects reflect three broad periodic characteristics. Subjects 3, 4, 6, 7 indicate a 2.5 day cyclicity, subjects 5 and 10 a 12 day cycle, and subjects 8 and 9 a 31 day cycle. The lead - lag relationship shows stress to lead alcohol intake in 5 subjects (Sj 4, 5, 7, 8, 9) and with alcohol leading in 2 subjects (3, 10). These trends are interesting and deserve further comment in the discussion chapter. It needs to be noted however that coherences are not high for this bivariate analysis.

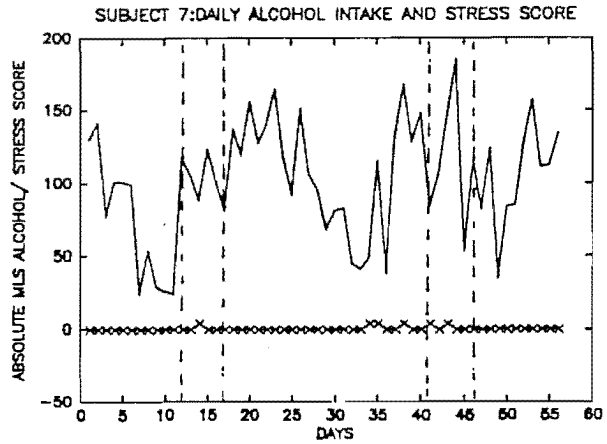
Figure 5.18: Alcohol intake and stress score for subjects 3 - 10

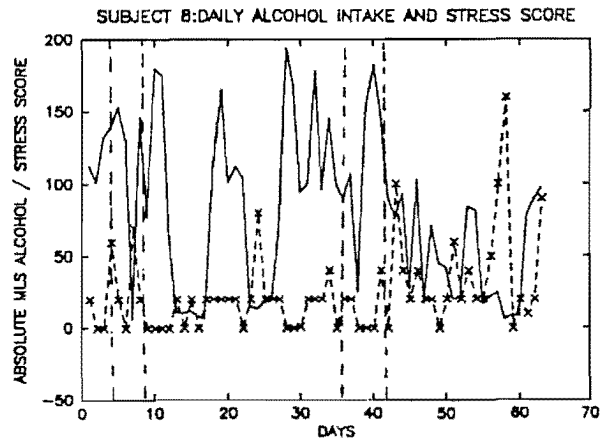


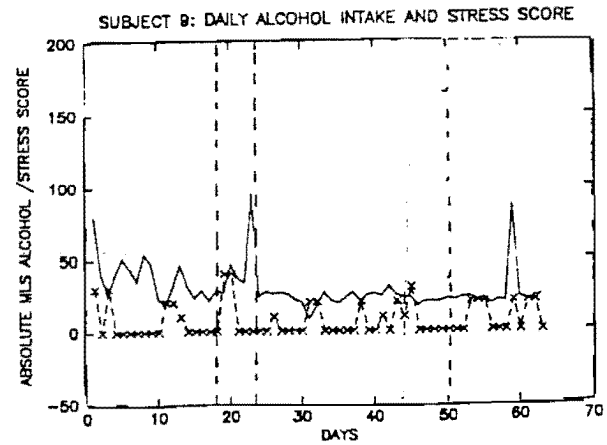


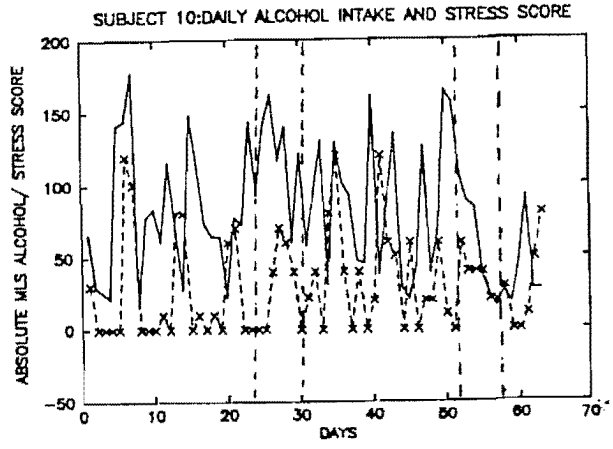












Premenstrual phase

In summary only one subject shows a coherence between the variable stress and alcohol intake. While there is a moderate coherence at varying frequencies for most sub jects, the positive slope of the phase spectrum at these coherences shows stress to lead alcohol consumption. The trend deserves comment in the discussion.

The final hypothesis suggests a relationship between personality type, symptom reporting and alcohol consumption. These scores are recorded in Table 5.10.

An interesting profile emerges. Subjects 3, 4, 8 and 10 have elevated extraversion scores (one standard deviation) and also tend to drink more alcohol per occasion on more occasions. They also reported more severe premenstrual-like symptoms. On visual analysis the neuroticism scores, when considered with alcohol intake and symptoms, indicate no general trend.

At the end of the study two further variables were analyzed. The two questionnaires for these were Negative Attitudes towards the menstrual cycle and Retrospective Distress Questionnaire. To recapitulate, the subjects' attitudes were assessed via a 35 polar item questionnaire which was repeated for menstruation, premenstruation and intermenstruum. Retrospective distress was assessed via the Menstrual Distress Questionnaire (MDQ) administered three times, one for each phase of the cycle. Here, the subject was asked to retrospect at the end of the study on past symptom experiences during menstruation, premenstruation and the rest of the cycle. Means and standard deviations for attitudes and retrospective distress across the three phases are presented in Table 5.11 and 5.12.

Table 5.10: Eysenck Personality Inventory Scores and Symptom Scores

	Extraversion Score	Neurotocism Score	Symptom Score (Mean over 63 days)	Drinking Occasions in 63 days	Alcohol Intake during 63 days Mean in absolute mls alcohol
Subject 3	17	12	21.51	40	29.2
4	15	8	24.23	26	47.5
5	13	18	15.19	53	40
6	10	13	16.95	49	9.5
7	5	4	15.94 *	6 *	4.0
8	17	18	22.98	44	35
9	8	4	13.17	21	21.4
10	19	21	26.54	39	49.6
	Mean 12.25	Mean 12.25	Mean 19.56		
	SD 4.9	SD 6.5	SD 4.86		
Norms women aged 30-39					
	Mean 11.97	Mean 12.57		Highest possible score 65	
	SD	SD 5.28		Lowest possible score 13	

* 56 days.

Table 5.11: Means and standard deviations of daily reported MDQ symptom scores and Retrospective MDQ Symptom Scores

Subject 3.

	Cycle Phase	Total Symptom Score	Physio Score	Affect Score
	Retrospective MDQ Score			
1.	Menstruation	35	29	6
2.	Intermenstrum	21	14	7
3.	Premenstruation	54	37	17
		M = 36.66	M = 26.66	M = 10.00
	Daily MDQ Score			
		M = 21.51	M = 13.790	M = 7.746
		SD= 5.99	SD = 3.636	SD= 2.951

Subject 4. MISSING.

Subject 5.

	Retrospective MDQ Score			
1.	Menstruation	27	20	7
2.	Intermenstrum	17	12	5
3.	Premenstruation	39	27	12
		M = 27.66	M = 19.6	M = 8.00
	Daily MDQ Score			
		M = 15.19	M = 10.46	M = 4.72
		SD = 2.82	SD = 1.75	SD = 1.44

Subject 6.

	Retrospective MDQ Score			
1.	Menstruation	29	19	10
2.	Intermenstrum	19	13	6
3.	Premenstruation	42	29	13
		M = 30	M = 20.3	M = 9.66
	Daily MDQ Score			
		M = 16.95	M = 11.82	M = 5.12
		SD = 2.46	SD = 1.67	SD = 1.36

Table 5.10 (Contd.):

Subject 7.

	Retrospective MDQ Score			
1.	Menstruation	3	5	3
2.	Intermenstrum	12	8	6
3.	Premenstruation	13	14	6
		M = 9.3	M = 9	M = 5
	Daily MDQ Score			
		M = 15.94	M = 10.76	M = 5.17
		SD = 2.29	SD = 1.54	SD = 1.73

Subject 8.

	Retrospective MDG Score			
1.	Menstruation	44	34	10
2.	Intermenstrum	16	11	5
3.	Premenstruation	45	33	12
		M = 35	M = 26	M = 9
	Daily MDQ Score			
		M = 22.98	M = 17.38	M = 5.60
		SD = 7.56	SD = 6.39	SD = s.31

Subject 9.

	Retrospective MDG Score			
1.	Menstruation	16	12	4
2.	Intermenstrum	13	9	4
3.	Premenstruation	15	11	4
		M = 14.66	M = 10.66	M = 4
	Daily MDQ Score			
		M = 13.17	M = 9.175	M = 4.00
		SD = .493	SD = .493	SD = 0.00

Subject 10.

	Retrospective MDG Score			
1.	Menstruation	38	29	9
2.	Intermenstrum	38	29	9
3.	Premenstruation	55	41	14
		M = 43.6	M = 33	M = 10.66
	Daily MDQ Score			
		M = 20.54	M = 19.47	M = 7.06
		SD = 11.10	SD = 7.83	SD = 4.18

Table 5.12: Means and standard deviations of Negative Attitude Questionnaire

Subject	C Y C L E P H A S E		
	Menstruation	Intermenstrum	Premenstrum
3	116	129	177
4		Missing	
5	144	140	145
6	154	112	167
7	152	120	176
8	155	115	157
9	144	144	142
10	153	132	198
	M = 145.43	M = 127.42	M = 166
	SD = 13.76	SD = 12.27	SD = 19.76

To investigate the relationship between actual symptoms (based on daily reporting in the study) and retrospective distress (as reported at the end of the study, the means for the two groups were calculated. Subjects 3, 5, 6, 8, and 10 all record higher symptom scores retrospectively supporting the claim that women tend to report inaccurate retrospections on symptoms related to the menstrual cycle. Exceptions were Subject 7 who tended to under report while Subject 9 shows accurate reporting of retrospective menstrual symptoms.

Further data analyses were performed with regard to women's negative attitudes toward the cycle. It appears the strongest negative attitude occurs in the premenstruum followed by the menstrual phase.

In order to assess if the subjects deduced the real purpose of the study both a written request to clarify the subjects' perceptions regarding the purpose of the Study (Appendix 9) and a post experimental interview was conducted.

All but one subject realized the focus of the study was to observe for changes in mood and physical states as related to the menstrual cycle and particularly the premenstrual phase. Subject 6 perceived the study to observe reactions of women to their activities and to the consumption of alcohol and drugs. Most hoped for a better treatment as a result of this work.

At the post-experimental interview subjects expressed surprise and disappointment at the purpose of the study. Most remarked how much more aware they had become of moods, symptoms and in some cases alcohol intake (subjects 3 and 4) by using the daily diary. However most did not suspect the

menstrual cycle to be a relevant variable when dealing with alcohol consumption and expressed their disappointment that this 'minor' event was the heart of the study. Support to this reaction came from the subjects' daily responses to life events in the daily diary which was an open-ended question requesting comment on any other significant events. This often triggered responses that related to partners leaving for business trips for several days, deaths in the family, difficulties with interpersonal relationships especially teenagers, vacations and major decisions. Furthermore such responses seem to strongly support that the subjects were unaware of the real purpose of the Study.

CHAPTER 6

DISCUSSION

This study which investigated the voluntary consumption of alcohol across the menstrual cycle, did not confirm the supposition that women who are moderate drinkers with a premenstrual syndrome consumed more alcohol at premenstruation to alleviate psychological and physiological distress.

It is probable that such previous empirically unvalidated claims (Belfar et al, 1971, Belfar and Shader, 1976, James, 1975, Jones and Jones, 1976a, 1976b, 1976c, Lisansky, 1957, Lolli, 1953, Podolsky, 1953, Wall, 1939) were modified by the women's negative expectations and perceptions of the premenstruum. None of the previous studies which cited increased alcohol consumption at premensturation did actually measure alcohol intake across the menstrual cycle. All but two previous studies gained such assertions from a small number of alcoholic women via retrospective reporting.

By eliminating the impact of the negative attitude, this study demonstrated that alcohol intake in moderate drinkers was not significantly higher at premenstruum nor at any other phase of the cycle, despite significant fluctuations in psychological and physiological symptomatology across the cycle.

The focal points of this study were the interaction of physical symptoms, mood and stress and more specifically, between (inferred) estrogen level and distress symptomatology across the menstrual cycle. In an attempt to

investigate a crucial link in Jones and Jones (1976b) model of alcoholism in women. This study examined the hypothesis that women consume more alcohol at the premenstruum in order to self-medicate negative affect which results from high levels of MAO inhibitors, which are assumed to be triggered by the naturally occuring drop in estrogen level at premenstruation. This phenomenon is expected to be present in normally cycling women.

Results suggest negative affect varies significantly between phases for these subjects but more importantly, alcohol intake did not significantly vary across the three phases. By inference the estrogen level does not seem to effect voluntary alcohol consumption in moderate drinkers.

Current lack of support for Jones and Jones (1976b) complex psycho-physiological model of alcoholism in women does not imply, however, that the model is completely incorrect. It is possible that this phenomenon is manifested only in very heavy drinkers and alcohol-dependent drinkers, where large amounts of alcohol suppress even further, women's already low levels of estrogen at premenstruation, triggering higher activity level of MAO inhibitors which lead to substantial depressive mood. This in turn is treated with more alcohol.

In this study the heavier moderate drinkers, reported more severe premenstrual symptoms (both dysphoric mood and physiological symptoms). It may be that these women are more vulnerable to gynaecological symptoms. These

subjects experienced more days of premenstrual symptoms and had longer cycles than other women in the study.

Such a phenomenon has not been demonstrated in heavy drinkers or alcohol-dependent drinkers, but one brief report (Ryback, 1977) does attest indirectly to the probability that large amounts of alcohol suppress estrogen levels. Ryback also reports complete cessation of menstruation in two women following three to seven months of heavy drinking (300-540 mls of 'hard' liquor per day). Menstruation ceased only to resume following two to three months of complete sobriety. These results do not note increased drinking at any phase of the menstrual cycle, but do testify to ethanols effects on endrocrine functions, and particularly on estrogen level, since menstruation is assumed to cease (such as in menopause) when estrogen level drops below a "threshold level".

It is possible that the variability in alcohol metabolism across the menstrual cycle might make women more cautious when drinking, so that if they were to feel intoxicated rather quickly as would be the case in non-takers of contraceptives, they might decrease their drinking accordingly. Previous research of voluntary alcohol consumption is associated with low estrogen levels (Aschkenasy-Lelu, 1958, 1960, Wallgren, 1970) but such a phenomenon was not replicated in human females. It is most likely that in contrast with rates and mice, human females' voluntary consumption level of alcohol is affected by a host of situational, environmental and

cognitive variables such as reason for drinking, social setting, level of intoxication, etc. to a much larger extent than the current level of the sex hormone such as estrogen.

However, the issue here is the claimed increase in alcohol consumption during premenstruation. This question will pose substantial difficulties to future investigators, since it will be hard to find normally menstruating women among alcohol-dependent drinkers. Wilsnack (1973) also reports a high incidence of gynaecological disorders in alcoholic women: 78% as compared with 39% in controls. Consequently, any sample of normally menstruating heavy drinkers will be an unrepresentative sample. It needs to be noted this study's choice of moderate drinkers was for these same reasons.

Results of this study supported the presence of a relationship between symptoms and cycle phase. As hypothesized, women with reported premenstrual syndrome experience an increase in specific symptoms at the premenstruum. A more detailed investigation as to the nature of the symptomatology revealed that physiological symptoms were more significant than symptoms of negative affect were, despite increases in the level of irritability and mood swings. These results seemed to undermine the importance of psychological components in favour of physiological components of the premenstrual syndrome.

In seeking a bivariate relationship with the variables alcohol consumption and premenstrual symptoms, no data was

strong enough to support this hypothesis. However, the resultant spectral density function had peaks at frequencies corresponding to weekly, perhaps a weekend, pattern of increased drinking. This was clearly the case when raw data was checked for the four heavier drinking subjects; they engaged in more social activities on Fridays and Saturdays. Furthermore it may be speculated that such social activities coincide with the premenstrual phase in which drinking may falsely be attributed to the premenstrual phase instead of the particular social interaction.

The third hypothesis attempted to investigate if mood fluctuations across the cycle are biochemically-dependent. The argument is that estrogen and progesterone affect levels of monoanine-oxidase (MAO) which in turn affect catecholamine-mediated neural activity in the brain. This central nervous system activity is, according to the hypothesis, related to psychological states of negative mood, particularly depression and irritibility. Currently available supporting evidence is indirect:

(a) endometrial monoamine-oxidase fluctuates throughout the menstrual cycle (Janowsky et al, 1971);

(b) estrogen therapy has been successfully used to treat depressed women (Klaibor et al, 1971, 1974);

(c) oral contraceptives affect both endometrial monoamine-oxidase levels and psychological depression (method for assessing "depression" is not stated: Grant and Pryse-Davies, 1968).

The proposed model of antecedents included social and interpersonal interactions. The effect of this variable was not analyzed in this study. However, it is possible that this non-biochemical variable has a large impact on mood fluctuation. The responses to the open-ended statement in the life events section of the daily diary suggest this to be possible. It is possible that the estrogen depletion during the premenstruum increases the susceptibility to depression and irritability. As such, negative mood will be manifested in the more emotionally vulnerable women.

This study showed that for two subjects a dysphoric mood state preceded alcohol intake but that it was unrelated to the premenstrual phase. The subject with the greatest coherence is one of the younger members of the group, consuming one of the higher quantities of alcohol per drinking occasion. A similar phenomonon was found in the study by Ascher Svanum (1982).

An assumption for this phenomenon is that some young women experience their bodily changes and negative mood in a more acute fashion and therefore tend to consume more alcohol. However, it may also be an indirect manifestation of the growing egalitarian processes between the sexes, where young women are not as restrained by gender stereotypes which perceive drinking behaviour as 'masculine'. This behaviour is more likely to be pronounced in younger women as older women have their own ingrained stereotypical gender characteristics.

The assumption that older women have more experience with their menstrual cycle and therefore may have learned not only to quickly detect distress symptamatology but also discover (accidentally, or by written sources or by word-of-mouth) alcohol's soothing effects on physiological symptoms, particularly water retention and uterine cramps was not supported in this study.

Perhaps older women become gradually more accustomed to their psychological and physiological variations across the cycle and subsequently learn to adjust to it and perceive it in a less acute fashion than younger women.

The findings that alcohol consumption was unrelated to premenstrual or menstrual distress offer, nevertheless, an interesting possibility which cannot be tested within this current design. It is possible that some women have already medicated themselves successfully with alcohol at premenstruation and/or menstruation and therefore do not report high levels of psychological and/or physiological distress at the time. This successful form of self-medication is likely, however, to be evident only in a small subgroup of moderate drinkers, since women in the current study were found to experience high levels of distress symptomatology at premenstruation and menstruation but were not found to consume more alcohol at any particular phase of the cycle.

It is impossible to verify this theoretical possibility with the data furnished by the present study, since there is a need for information regarding a woman's level

of distress prior to the start of the habit of self-medication with alcohol. This would require a longitudinal study spanning months if not years.

It further appeared when testing the fourth hypothesis that the menstrual and premenstrual phase were the more stressful for some subjects. It may be more adequate to present those who experience this distress as the 'paramenstrual syndrome.'

A different kind of vulnerability has been reported in women with higher body weight; they are significantly more likely to experience water retention at premenstruation, suggesting two possibilities:

(a) heavier women do indeed retain more water at the premenstruum and/or

(b) greater awareness and sensitivity to weight gain at premenstruum is manifested in heavier women than in lighter-weight women.

The heaviest woman in this study certainly reported highest stress scores during the premenstruum and menstruum. Another subject outrightly declared the premenstrual phase was too stressful and drank to relieve distressing physiological symptoms. Both these women worked and were married. This supports a difference Johnson (1982) found in a study summarizing differences between most women. Increased frequency of drinking in females is more likely to be preceded by stressful life events than in males. Working women, particularly those who were married, were found to be problem drinkers. While problem drinking does not describe these women's drinking behaviour, Gomberg (1981) states that there are certain subgroups

of women that may be recognised as possible problem drinkers who have such antecedents, or vulnerability.

Following on upon this analysis, two of the women in the sample (S/s 3 + 10) who were older, were found to increase alcohol intake and then report an increase in stress. Perhaps this consequence indicates a vulnerability and could predispose the women to develop a dependence on alcohol.

One other previous stressful event for women was also investigated in this study. Childless women and women who have at least one child have frequently been told by their physicians that once they bring a child into the world their distress will markedly subside (Ascher-Svaum, 1982). Results did not confirm this common supposition. The two childless women had differing experiences of stress. This demonstrates that childless women and women with at least one child in this study did not differ significantly in their reporting of symptoms or stress levels during the three cycle phases.

Studies in both menstrual cycle research and alcohol research on women suggest a personality factor peculiar to women with PMS and a heavy drinking problem (Coppen et al, 1963, Kessel et al, 1963, Jones and Jones, 1974). It was found that those subjects who had elevated extraversion scores tended to report more symptoms than introverts. Results in this study support this. Furthermore, these women also tended to drink more alcohol per occasion on more occasions.

From this evidence they suggest either female extraverts have more menstrual symptoms than introverts or they are more willing to discuss them.

In addition to measuring daily fluctuations of psychological and physiological symptoms, the study also asked the subject (at termination time) to retrospectively report her perceptions as she experienced the three phases of the cycle. It was interesting to note that retrospective reporting of symptoms was significantly higher than the actual daily reporting. This suggests that reliance on retrospective procedures are substantially affected by the individual's beliefs and attitudes. This was demonstrated in this study when negative attitudes towards the premenstruum and the menstruum were significantly greater than in the intermenstruum. This gives some support to Fontana's (1966) expressed cautions and risks in using retrospective self-reports.

Accurate self-report of alcohol intake in non-dependent drinkers has been subject to some scrutiny. There is good evidence, however, that self-reports of drinking behaviour have high validity (Shranger et al, 1981, Single, 1975, Myers, 1983). Results from this study confirm this. Subjects' retrospective reporting of alcohol consumption gained at the initial interview, correlated highly (r.84) with the daily self-monitored recording of alcohol intake.

Effectiveness of the Design.

The single-subject longitudinal design used in this research was suitable but caused difficulties. Its greatest

strength was that it allowed examination of the individual's mood,stress,and symptoms, and daily alcohol consumption. This opportunity is vital when research is based on the interactional model, the basis of which is the recognition of individual differences.

However, the length of the study - that of sixty-three days - only just allowed for the minimum number of data points required for time series analysis. Data from at least two more cycles would have given more support to the variations that occurred, As it is, the author was impressed by the enthusiasm of the subjects to record data for such a length of time as this kind of research is rather intrusive in the lives of subjects.

Another difficulty is that intensive longitudinal research often precludes the use of large samples which makes generalizations to the population under study difficult.

The importance of using subjects as their own controls is illustrated in this research by the wide range of individual responses to the subjective measures of mood,stress, symptoms and alcohol intake. Research designs with subjects as their own controls, and those utilizing repeated measures analyses for small to medium size groups,appear to be suitable for alcohol and menstrual cycle research.

The sample under study was a particular subgroup of women representative of moderate drinkers. Subjects were also defined by the presence of premenstrual syndrome. That this phenomenon is being researched in Christchurch leaves a small and therefore non-representative sample of

women who have P.M.S. available for research. Certainly the specific criteria used to select subjects make probable antecedents of increased alcohol intake only generalizable to moderate drinkers with P.M.S. symptoms.

However, recognising the study's aim as descriptive, relationships between variables and characteristics were sought rather than definite findings that could be generalized.

Another difficulty of this research is that of using alcohol-dependent women, due to the anovulatory effect of heavy alcohol consumption.

Lastly, the two variables - social interaction (life events) and analgesic intake - were recorded in the study but were not analysed. These two variables were retrospectively considered to effect subjects mood and symptoms. That subjects medicate with analgesic instead of alcohol may have indicated an alternative dependency.

Limitations of the Research.

The major limitations of this research were:

1. The length of the study allowed for just more than the minimum number of data points.
2. The small sample size and type of population used makes results specific to these subjects and no other.
3. Two additional variables that may have affected the variables, alcohol intake and physical symptoms (life events and analgesic intake) were not included in the analyses.

4. Time series analysis data was analysed with point T_1 commencing on the first day of data collection not the first day of the cycle. While two cycles were analyzed they may not always have been two consecutive cycles.
5. Due to the short run of data, a wider band width was used in the analysis. This may have over-smoothed the data with less definition at smaller frequencies or periods greater than twenty-one days.

CHAPTER 7

CONCLUSIONS

The conclusions of this research are :

1. Alcohol consumption in moderate drinkers does not significantly increase at premenstruation or at any other phase of the menstrual cycle in women with premenstrual syndrome.
2. Alcohol consumption in moderate drinkers is unrelated to the level of psychological and/or physiological distress at any phase of the cycle.
3. Alcohol consumption tended to peak at a 7-12 day cycle suggesting a weekly, perhaps weekend, drinking pattern in moderate drinkers.
4. Premenstrual syndrome does exist in normally cycling women.
5. Risk factors that may predispose women with P.M.S. to alcohol dependency are age of the woman, personality and severity of P.M.S. symptoms.
6. The use of visual analogue scale, and daily symptoms are suitable methods for measuring subjective psychological and physiological distress.
7. Time series analysis employed for menstrual cycle research is useful.
8. Retrospective reporting of alcohol intake has high validity while retrospective reporting of premenstrual symptoms has low validity.

Suggestions for Further Research.

1. The finding that younger women in this study were most vulnerable to premenstrual symptoms if their alcohol intake was high could be examined further. A longitudinal study of moderate drinkers in the 25-30 year age group using a similar statistical analysis as in this study would highlight combinations of antecedents. These results would be compared to that of a control group who report premenstrual symptoms but don't drink. Specific note of alternative medications used to self-medicate in this latter group would be made.

2. Further research among young New Zealand women assessing the quality of social interaction and its influence on mood and consequent alcohol consumption would assist in distinguishing physiological antecedents from psychological and social antecedents.

3. The relationship of estrogen levels to alcohol dependency and depression is not clear. Are these two manifestations of the same problem? Which is primary, which is secondary? If depression is common among women, is it more common among alcoholic women than non-alcoholic women? Using both psychological measures (visual analogue scale) and biochemical indices (levels of estrogen) differences in depressive mood for alcohol consuming women versus non-alcohol consuming women could be examined.

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APPENDIX 1

A STUDY ON MOOD AND BEHAVIOUR

Are you interested in joining a study that is looking at mood and behaviour related to the menstrual cycle. The study will go for a period of two months and requires subjects to keep special daily records on psychological and physiological events.

There is little known about the way these two variables influence one another in women. Your interest would contribute to a growing body of work in this area.

This study is being conducted by Marijke Batenburg for a masters thesis in psychology, University of Canterbury.

Should you wish to take part, allow Dr. McGill to note your name and contact number or address on this form. All information you disclose is strictly confidential.

I would be interested in taking part in this study on mood and behaviour related to the menstrual cycle.

My name is_____

I can be contacted at _____ (best time)

Signed_____

APPENDIX 2

INITIAL QUESTIONNAIRE FOR THE STUDY MOOD AND BEHAVIOUR RELATED TO PSYCHOLOGICAL AND PHYSIOLOGICAL EVENTS

1. Circle the licit drug that applies.

   cigarettes _____
   barbituates _____
   tranquilisers _____
   birth control pill _____
   diet pills _____
   laxative _____
   antiacids _____

2. Are you menstruating regularly YES NO

3. Circle the symptoms that you have at any stage of your menstrual cycle.

   Pain; Muscle stiffness, headaches, cramps, backaches, fatigue, general aches and pains.

   Behaviour; Crying, loneliness, anxiety, restlessness, irritability, mood swings, depression, tension.

   Water Retention: Weight gain, skin disorders, painful breasts, swelling.

4. Circle the statement that applies

   I drink an alcoholic beverage

   about once a month
   two or three times a month
   once or twice a week
   three or more times a week
   nearly every day
   twice a day
   three or more times a day

5. How much do you drink on nearly every occasion or more than half of the time.

   one drink
   two drinks
   three drinks
   four drinks
   five drinks
   six drinks
   more than six.

6. Do you have anything noteworthy in your medical history?

7. Are you under any psychological treatment at present?

Would you be prepared to continue being a subject in this study?

YES NO

NAME _____ CONTACT NUMBER _____

TIME MOST SUITABLE FOR INTERVIEW _____

APPENDIX 3

SUBJECT NUMBER:

Name
Address Telephone
Date of Birth Age Hgt Wgt

Nationality

Education (highest qualification)

Occupation Current Full/Part-time
Last if unemployed
Are you the principal breadwinner?

Marital Status
Single
No previous partnership
Previous partnership lasted
Time since last partnership
Living with partner
Married, de facto
Length of cohabitation
Satisfaction with status_____

Children
Number
Ages

Living Style
Alone
With partner (& children) Nuclear
With others Extended

Physical Health
What is your perception of your general health

1 2 3 4 5
v.good fair v.poor

Normal hours of sleep
Any familial disorders
Any current medication or treatment
Have you been hospitalised in the last 2 years

Diet
Daily meal pattern
Food orientation
Food in tolerances

Emotional well-being perception of emotional well-being

1 2 3 4 5

Have you ever had any contact with a counsellor?

Menstrual
Age menses began
Check beliefs when began

Current length of cycles reg irreg
Length of menses
Symptoms during cycle Physical
Emotional
Duration of these symptoms months years

Contraception
Present
Past

Pregnancies
Number
Any problems during pregnancy
Any problems post pregnancy
Age at pregnancy

APPENDIX 3 (Continued)

Licit Drug Use — During the last four weeks you may have used a variety of drugs, e.g. caeffine in your coffee. Can you indicate how much, how often and what.

caffine
nicotine
analgesic
sedative
tranquiliser
antiacids
other prescrib/non prescrib

Consumption Alcohol

Frequency

How many glasses do you drink at each occasion?

Beer
Light wine
Fortified wine
Spirits

How often do you drink?

3 x day
2 x day
1 x day
3 - 4 x week
1 - 2 x week
2 - 3 x month
1 x month

What was the most you've ever drunk on on occasion?

How old were you when you first started drinking?

Setting

Do you tend to drink

- in a bar
- in a restaurant
- at home
- at others home
- at work
- private club
- at social events
- outdoors
- other

Do you drink

- alone
- with spouse/partner
- friends
- strangers
- co-workers
- companion

Can you specify personal events or feelings when you drink more than usual?
e.g., nervous, restless, lonely, sad, excited, frustrated

What beverage do you prefer?

Type:
Preferred manner drink?
Brand:

Does your spouse/partner drink?

The Life Experiences Survey

Listed below are a number of events which sometimes bring about change in the lives of those who experience them and which necessitate social readjustment. Please check those events which you have experienced in the recent past and indicate the time period during which you have experienced each event. Be sure that all check marks are directly across from the items they correspond to.

Also, for each item checked below, please indicate the extent to which you viewed the event as having either a positive or negative impact on your life at the time the event occurred. That is, indicate the type and extent of impact that the event had. A rating of -3 would indicate an extremely negative impact. A rating of 0 suggests no impact either positive or negative. A rating of +3 would indicate an extremely positive impact.

	0 to 6 mo	7 mo to 1 yr	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
1. Marriage			-3	-2	-1	0	+1	+2	+3
2. Detention in jail or comparable institution			-3	-2	-1	0	+1	+2	+3
3. Death of spouse			-3	-2	-1	0	+1	+2	+3
4. Major change in sleeping habits (much more or much less sleep)			-3	-2	-1	0	+1	+2	-3
5. Death of a close family member:									
a. mother			-3	-2	-1	0	+1	+2	-3
b. father			-3	-2	-1	0	+1	+2	-3
c. brother			-3	-2	-1	0	+1	+2	+3
d. sister			-3	-2	-1	0	+1	+2	-3
e. grandmother			-3	-2	-1	0	+1	+2	+3
f. grandfather			-3	-2	-1	0	+1	+2	+3
g. other (specify)			-3	-2	-1	0	+1	+2	+3
6. Major change in eating habits (much more or much less food intake)			-3	-2	-1	0	+1	+2	+3
7. Foreclosure on mortgage or loan			-3	-2	-1	0	+1	+2	+3
8. Death of close friend			-3	-2	-1	0	+1	+2	-3
9. Outstanding personal achievement			-3	-2	-1	0	+1	+2	+3
10. Minor law violations (traffic tickets, disturbing the peace, etc.)			-3	-2	-1	0	+1	+2	+3
11. Male: Wife/girlfriend's pregnancy			-3	-2	-1	0	+1	+2	+3
12. Female: Pregnancy			-3	-2	-1	0	+1	+2	+3
13. Changed work situation (different work responsibility, major change in working conditions, working hours, etc.)			-3	-2	-1	0	+1	+2	+3
14. New job			-3	-2	-1	0	+1	+2	+3
15. Serious illness or injury of close family member:									
a. father			-3	-2	-1	0	+1	+2	+3
b. mother			-3	-2	-1	0	+1	+2	+3
c. sister			-3	-2	-1	0	+1	+2	+3
d. brother			-3	-2	-1	0	+1	+2	+3
e. grandfather			-3	-2	-1	0	+1	+2	+3
f. grandmother			-3	-2	-1	0	+1	+2	+3
g. spouse			-3	-2	-1	0	+1	+2	+3
h. other (specify)			-3	-2	-1	0	+1	+2	+3
16. Sexual difficulties			-3	-2	-1	0	+1	+2	+3
17. Trouble with employer (in danger of losing job, being suspended, demoted, etc.)			-3	-2	-1	0	+1	+2	+3
18. Trouble with in-laws			-3	-2	-1	0	+1	+2	+3
19. Major change in financial status (a lot better off or a lot worse off)			-3	-2	-1	0	+1	+2	+3
20. Major change in closeness of family members (increased or decreased closeness)			-3	-2	-1	0	+1	+2	+3
21. Gaining a new family member (through birth, adoption, family member moving in, etc.)			-3	-2	-1	0	+1	+2	+3
22. Change of residence			-3	-2	-1	0	+1	+2	+3
23. Marital separation from mate (due to conflict)			-3	-2	-1	0	+1	+2	+3
24. Major change in church activities (increased or decreased attendance)			-3	-2	-1	0	+1	+2	+3
25. Marital reconciliation with mate			-3	-2	-1	0	+1	+2	+3
26. Major change in number of arguments with spouse (a lot more or a lot less arguments)			-3	-2	-1	0	+1	+2	+3
27. Married male: Change in wife's work outside the home (beginning work, ceasing work, changing to a new job, etc.)			-3	-2	-1	0	+1	+2	+1
28. Married female: Change in husband's work (loss of job, beginning new job, retirement, etc.)			-3	-2	-1	0	+1	+2	+3
29. Major change in usual type and/or amount of recreation.			-3	-2	-1	0	+1	+2	+3
30. Borrowing more than $10,000 (buying home, business, etc.)			-3	-2	-1	0	+1	+2	+3
31. Borrowing less than $10,000 (buying car, TV, getting school loan, etc.)			-3	-2	-1	0	+1	+2	+3
32. Being fired from job			-3	-2	-1	0	+1	+2	+3
33. Male: Wife/girlfriend having abortion			-3	-2	-1	0	+1	+2	+3
34. Female: Having abortion			-3	-2	-1	0	+1	+2	+3
35. Major personal illness or injury			-3	-2	-1	0	+1	+2	+3
36. Major change in social activities, e.g. parties, movies, visiting (increased or decreased participation)			-3	-2	-1	0	+1	+2	+3
37. Major change in living conditions of family (building new home, remodeling, deterioration of home, neighborhood, etc.)			-3	-2	-1	0	+1	+2	+3
38. Divorce			-3	-2	-1	0	+1	+2	+3
39. Serious injury or illness of close friend.			-3	-2	-1	0	+1	+2	+3
40. Retirement from work			-3	-2	-1	0	+1	+2	+3
41. Son or daughter leaving home (due to marriage, college, etc.)			-3	-2	-1	0	+1	+2	+3
42. Ending of formal schooling			-3	-2	-1	0	+1	+2	+3
43. Separation from spouse (due to work, travel, etc.)			-3	-2	-1	0	+1	+2	+3
44. Engagement			-3	-2	-1	0	+1	+2	+3
45. Breaking up with boyfriend/girlfriend			-3	-2	-1	0	+1	+2	+3
46. Leaving home for the first time			-3	-2	-1	0	+1	+2	+3
47. Reconciliation with boyfriend/girlfriend			-3	-2	-1	0	+1	+2	+3
Other recent experiences which have had an impact on your life. List and rate.									
48. _____			-3	-2	-1	0	+1	+2	+3
49. _____			-3	-2	-1	0	+1	+2	+3
50. _____			-3	-2	-1	0	+1	+2	+3

E.P.Q. (Adult)

Occupation .....

Age ..... Sex.....

INSTRUCTIONS Please answer each question by putting a circle around the "YES" or the "NO" following the question. There are no right or wrong answers, and no trick questions. Work quickly and do not think too long about the exact meaning of the questions.

PLEASE REMEMBER TO ANSWER EACH QUESTION

1	Do you have many different hobbies?	YES	NO
2	Do you stop to think things over before doing anything?	YES	NO
3	Does your mood often go up and down?	YES	NO
4	Have you ever taken the praise for something you knew someone else had really done?	YES	NO
5	Are you a talkative person?	YES	NO
6	Would being in debt worry you?	YES	NO
7	Do you ever feel "just miserable" for no reason?	YES	NO
8	Were you ever greedy by helping yourself to more than your share of anything?	YES	NO
9	Do you lock up your house carefully at night?	YES	NO
10	Are you rather lively?	YES	NO
11	Would it upset you a lot to see a child or an animal suffer?	YES	NO
12	Do you often worry about things you should not have done or said?	YES	NO
13	If you say you will do something, do you always keep your promise no matter how inconvenient it might be?	YES	NO
14	Can you usually let yourself go and enjoy yourself at a lively party?	YES	NO
15	Are you an irritable person?	YES	NO
16	Have you ever blamed someone for doing something you knew was really your fault?	YES	NO
17	Do you enjoy meeting new people?	YES	NO
18	Do you believe insurance schemes are a good idea?	YES	NO
19	Are your feelings easily hurt?	YES	NO
20	Are *all* your habits good and desirable ones?	YES	NO

PLEASE TURN OVER

21	Do you tend to keep in the background on social occasions?	YES	NO
22	Would you take drugs which may have strange or dangerous effects?	YES	NO
23	Do you often feel "fed-up"?	YES	NO
24	Have you ever taken anything (even a pin or button) that belonged to someone else?	YES	NO
25	Do you like going out a lot?	YES	NO
26	Do you enjoy hurting people you love?	YES	NO
27	Are you often troubled about feelings of guilt?	YES	NO
28	Do you sometimes talk about things you know nothing about?	YES	NO
29	Do you prefer reading to meeting people?	YES	NO
30	Do you have enemies who want to harm you?	YES	NO
31	Would you call yourself a nervous person?	YES	NO
32	Do you have many friends?	YES	NO
33	Do you enjoy practical jokes that can sometimes really hurt people?	YES	NO
34	Are you a worrier?	YES	NO
35	As a child did you do as you were told immediately and without grumbling?	YES	NO
36	Would you call yourself happy-go-lucky?	YES	NO
37	Do good manners and cleanliness matter much to you?	YES	NO
38	Do you worry about awful things that might happen?	YES	NO
39	Have you ever broken or lost something belonging to someone else?	YES	NO
40	Do you usually take the initiative in making new friends?	YES	NO
41	Would you call yourself tense or "highly-strung"?	YES	NO
42	Are you mostly quiet when you are with other people?	YES	NO
43	Do you think marriage is old-fashioned and should be done away with?	YES	NO
44	Do you sometimes boast a little?	YES	NO
45	Can you easily get some life into a rather dull party?	YES	NO
46	Do people who drive carefully annoy you?	YES	NO
47	Do you worry about your health?	YES	NO
48	Have you ever said anything bad or nasty about anyone?	YES	NO
49	Do you like telling jokes and funny stories to your friends?	YES	NO
50	Do most things taste the same to you?	YES	NO
51	As a child were you ever cheeky to your parents?	YES	NO
52	Do you like mixing with people?	YES	NO
53	Does it worry you if you know there are mistakes in your work?	YES	NO
54	Do you suffer from sleeplessness?	YES	NO

APPENDIX 6(i)

THE DAILY DIARY SHEET

The daily diary sheet includes information about daily activities, moods, physiological events and the consumption of alcohol and other licit drugs. The mood scales are to be filled out an hour after waking and again between 6 p.m. and 8 p.m. The rest of the diary sheet is to be completed just before going to bed. It is easy to fill out and will only take a few minutes each day.

How to Record Activities in Diary

Put an 'X' in the box for each hour along the line for the activity you spent the greater part of that hour doing.

SLEEP: Mark 'X' for any time period on the scale during which you slept. Note how many hours you slept the previous night in the little box above the activities.

HOUSEWORK: Includes routine activities in, around and connected with the house, including meals except those that you consider to be your work or relaxation.

WORK: Includes paid and voluntary employment, study travelling time and activities at home other than housekeeping or activities done chiefly for relaxation.

RELAXATION: Includes solitary, social activities. Sport or exercise is active relaxation.

How to record mood

The mood scale is done twice a day, once within the first hour of waking and again in the evening between 6 p.m. - 8 p.m. Try to estimate as accurately as possible how strong each particular feeling is right at that moment.

How to record events

Circle the appropriate statement. With support or interes group - specify, e.g. polytech course, PMT group, etc. Briefly note an outline of 'other' if necessary.

How to record physiological events

Place a cross in the column that indicates how you experienced any of the symptoms for the last 24 hours.

How to record alcohol consumption and licit drug consumption

Before going to bed record as accurately as possible the consumption of any alcohol or other licit drugs. Note the amount you had. The sizes of drinks are as follows beer glass, wine glass, sherry glass or nips of spirits.

Weight

Record your weight above the daily diary every seventh day.

Ensure that each day has been dated and your code number is in

of hours slept previous night ☐

) Within an hour of getting up identify your mood by placing a cross on the line at the position which is closest to the way you felt.

ıappy	_____	happy
ıausted	_____	energetic
ıse	_____	relaxed
ɔeless	_____	confident
ɾitable	_____	friendly
×ual feeling none	_____	sexual feeling hi
t stressed at all	_____	very stressed
ɔr concentration	_____	good concentration

) Between 6 p.m. - 8 p.m. Place a cross on the line at the position which is closest to the way you felt.

ıappy	_____	happy
ıausted	_____	energetic
ıse	_____	relaxed
ɔeless	_____	confident
ɾitable	_____	friendly
×ual feeling none	_____	sexual feeling hi
t stressed at all	_____	very stressed
ɔr concentration	_____	good concentration

) Daily Diary

	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
ɜep																			
ɹsework																			
ɾk																			
lax: passive																			
lax: active																			
ıer event																			

) Did any of the following happen in the last 24 hrs?
was entertained at home/outside home
became physically sick/was injured
had accident at home/in car
significant other became sick/was injured
started menstruating/am menstruating
irritated or disagreement with another
went to a support group/interest group - specify
any other significant event.

On a scale from 1-5 rate how you have experienced each of the following in the last 24 hours by placing a X in the appropriate column.

	1	2	3	4	5
wgt gain					
crying					
muscle stiffness					
headache					
skin disorder					
loneliness					
cramp					
backache					
restlessness					
tender breasts					
swelling					
general aches					
mood swings					

1 = not experienced at all
2 = barely noticeable
3 = present mild
4 = present mod.
5 = present strong

(f) Alcohol consumption
Did you have alcohol in the last 24 hrs?

YES NO Circle reason

Type:
Amount:
Size of drink:
Drinking location:

curiosity
pleasure
enhance mood
to relax
social pressure

(g) Licit drug use
Did you have any of the following in the last 24 hrs?

	Amount
coffee	
tea	
nicotine	
analgesic	
sedative	
tranquiliser	
diet pills	
laxative	
any other	

APPENDIX 7

CONSENT FORM

SUBJECT'S NAME:

PROJECT TITLE: Mood and Behaviour Related to Psychological and Physiological Events.

RESEARCHER: Marijke Batenburg

DESCRIPTION OF PROCEDURE: The research process is as follows:

During the next nine weeks each subject will be asked to respond on a daily basis. On a daily diary form the subject relates (1) daily activities, (2) morning and evening mood state, (3) life events, (4) physiological well-being as experienced in the last 24 hours, and (5) alcohol and licit drug consumption during the last 24 hours.

On a separate form the subject records her daily body temperature, taken on waking. The thermometer is provided.

I understand the activity in which I am being asked to participate and the procedure that will be performed. I have had the chance to ask questions and understand that I may ask additional questions anytime the study is in progress. I understand that I am participating in this study of my own free will and am free to withdraw my consent and discontinue my participation at anytime in the study.

This is to certify that I am willing to participate in this project under the direction of the researcher named above.

Signature subject_____

Signature researcher_____

Date_____

THE MENSTRUAL DISTRESS QUESTIONNAIRE (MDQ)

Symptoms experienced during the menstrual cycle

Here is a list of symptoms which women sometimes experience during the menstrual cycle. Please describe your experience of each symptom during the three different time periods listed below on a scale from 1 - 5.

	First 3 days of menstruation	7 days before menstruation	Remainder of the menstrual cycle
1. Weight gain	____	____	____
2. Insomnia	____	____	____
3. Crying	____	____	____
4. Lowered school or work performance	____	____	____
5. Muscle stiffness	____	____	____
6. Forgetfulness	____	____	____
7. Confusion	____	____	____
8. Take naps or stay in bed	____	____	____
9. Headache	____	____	____
10. Skin disorders	____	____	____
11. Loneliness	____	____	____
12. Feelings of suffocation	____	____	____
13. Affectionate	____	____	____
14. Orderliness	____	____	____
15. Stay at home form work or school	____	____	____
16. Cramps (uterine or pelvic)	____	____	____
17. Dizziness or faintness	____	____	____
18. Excitement	____	____	____
19. Chest pains	____	____	____
20. Avoid social activities	____	____	____
21. Anxiety	____	____	____
22. Backache	____	____	____
23. Cold sweats	____	____	____
24. Lowered judgment	____	____	____
25. Fatigue	____	____	____
26. Nausea or vomiting	____	____	____
27. Restlessness	____	____	____
28. Hot flushes	____	____	____
29. Difficulty in concentration	____	____	____
30. Painful or tender breasts	____	____	____

Descriptive Categories

1 - not experienced at all
2 - barely noticeable
3 - present, mild
4 - present mod.
5 - present strong

THE MENSTRUAL DISTRESS QUESTIONNAIRE (MDQ)

Symptoms experienced during the menstrual cycle

	First 3 days of menstruation	7 days before menstruation	Remainder of the menstrual cycle
31. Feelings of well-being	____	____	____
32. Buzzing or ringing in ears	____	____	____
33. Distractable	____	____	____
34. Swelling (e.g. abdomen, ankles)	____	____	____
35. Accidents (e.g. cut finger, break dish)	____	____	____
36. Irritability	____	____	____
37. General aches and pains	____	____	____
38. Mood swings	____	____	____
39. Heart pounding	____	____	____
40. Depression (feeling sad/blue)	____	____	____
41. Decreased efficiency	____	____	____
42. Lowered motor co-ordination	____	____	____
43. Numbness & tingling in hands & feet	____	____	____
44. Change in eating habits	____	____	____
45. Tension	____	____	____
46. Blind spots or fuzzy vision	____	____	____
47. Bursts of energy or activity	____	____	____

Department of Psychology
University of Canterbury Christchurch 1 New Zealand

Dear

From the data collected so far it appears that the way the menstrual cycle is perceived might be a meaningful variable in the study. The following questionnaire is aimed at you having to judge phases of the menstrual cycle against a series of description scales.

The phases are: menstruation - first three days of menstrual flow; premenstruation (the seven days preceding menstruation) and the rest of the menstrual cycle days.

On each page you will find a different phase to be judged. Please make these judgements on the basis of what these times of the month mean to you. Here is how you are to rate each concept on the scale given.

If you feel the concept at the top of the page is very closely related to one end of the scale, you should place your check mark as follows:

fair : X ___ ___ ___ ___ ___ ___ unfair

or

fair ___ ___ ___ ___ ___ ___ X unfair

If you feel that the concept is quite closely related to one or other end of the scale (but not extremely) place your check mark as follows:

strong ___ X ___ ___ ___ ___ ___ weak

or

strong ___ ___ ___ ___ ___ X ___ weak

If the concept seems only slightly related

active ___ ___ X ___ ___ ___ ___ passive

or

active ___ ___ ___ ___ X ___ ___ passive

If you consider the concept to be neutral on the scale

safe ___ ___ ___ X ___ ___ ___ dangerous

It appears that while some subjects have a definite idea about the purpose of the study some others do not. I therefore ask you to briefly in 2 - 3 sentences describe the purpose of the study as you perceive it.

Nine weeks is nearly over. Once more I want to thank you for your continued support throughout this time. This study will be completed by December '84.

Kind regards,

Marijke Batenburg

MENSTRUATION (first 3 days of menstrual flow)

1.	positive	___	___	___	___	___	___	___	negative
2.	sick	___	___	___	___	___	___	___	healthy
3.	valuable	___	___	___	___	___	___	___	worthless
4.	young	___	___	___	___	___	___	___	old
5.	fair	___	___	___	___	___	___	___	unfair
6.	stale	___	___	___	___	___	___	___	fresh
7.	tense	___	___	___	___	___	___	___	relaxed
8.	sweet	___	___	___	___	___	___	___	bitter
9.	calm	___	___	___	___	___	___	___	agitated
10.	nice	___	___	___	___	___	___	___	awful
11.	dirty	___	___	___	___	___	___	___	clean
12.	sociable	___	___	___	___	___	___	___	unsociable
13.	happy	___	___	___	___	___	___	___	sad
14.	dangerous	___	___	___	___	___	___	___	safe
15.	good	___	___	___	___	___	___	___	bad
16.	empty	___	___	___	___	___	___	___	full
17.	graceful	___	___	___	___	___	___	___	awkward
18.	impure	___	___	___	___	___	___	___	pure
19.	comfortable	___	___	___	___	___	___	___	uncomfortable
20.	beautiful	___	___	___	___	___	___	___	ugly
21.	fortunate	___	___	___	___	___	___	___	unfortunate
22.	important	___	___	___	___	___	___	___	unimportant
23.	repelling	___	___	___	___	___	___	___	attracting
24.	tasty	___	___	___	___	___	___	___	distasteful
25.	peaceful	___	___	___	___	___	___	___	ferocious
26.	perfect	___	___	___	___	___	___	___	imperfect
27.	cruel	___	___	___	___	___	___	___	kind
28.	painful	___	___	___	___	___	___	___	pleasurable

MENSTRUATION (first 3 days of menstrual flow)

29.	meaningless	___	___	___	___	___	___	___	meaningful
30.	depressed	___	___	___	___	___	___	___	elevated
31.	fragrant	___	___	___	___	___	___	___	foul
32.	soothing	___	___	___	___	___	___	___	aggravating
33.	useless	___	___	___	___	___	___	___	useful
34.	sharp	___	___	___	___	___	___	___	dull
35.	heavenly	___	___	___	___	___	___	___	hellish

PREMENSTRUATION (7 days before start of menstrual flow)

1.	impure	___	___	___	___	___	___	___	pure
2.	comfortable	___	___	___	___	___	___	___	uncomfortable
3.	beautiful	___	___	___	___	___	___	___	ugly
4.	fortunate	___	___	___	___	___	___	___	unfortunate
5.	important	___	___	___	___	___	___	___	unimportant
6.	cruel	___	___	___	___	___	___	___	kind
7.	painful	___	___	___	___	___	___	___	pleasurable
8.	meaningless	___	___	___	___	___	___	___	meaningful
9.	depressed	___	___	___	___	___	___	___	elevated
10.	repelling	___	___	___	___	___	___	___	attracting
11.	tasty	___	___	___	___	___	___	___	distastful
12.	peaceful	___	___	___	___	___	___	___	ferocious
13.	perfect	___	___	___	___	___	___	___	imperfect
14.	sharp	___	___	___	___	___	___	___	dull
15.	heavenly	___	___	___	___	___	___	___	hellish
16.	happy	___	___	___	___	___	___	___	sad
17.	dangerous	___	___	___	___	___	___	___	safe
18.	good	___	___	___	___	___	___	___	bad
19.	empty	___	___	___	___	___	___	___	full
20.	graceful	___	___	___	___	___	___	___	awkward
21.	fragrant	___	___	___	___	___	___	___	foul
22.	soothing	___	___	___	___	___	___	___	aggravating
23.	useless	___	___	___	___	___	___	___	useful
24.	tense	___	___	___	___	___	___	___	relaxed
25.	sweet	___	___	___	___	___	___	___	bitter
26.	calm	___	___	___	___	___	___	___	agitated
27.	nice	___	___	___	___	___	___	___	awful
28.	dirty	___	___	___	___	___	___	___	clean

PREMENSTRUATION (7 days before start of menstrual flow)

30.	positive	___	___	___	___	___	___	___	negative
31.	sick	___	___	___	___	___	___	___	healthy
32.	valuable	___	___	___	___	___	___	___	worthless
33.	young	___	___	___	___	___	___	___	old
34.	fair	___	___	___	___	___	___	___	unfair
35.	stale	___	___	___	___	___	___	___	fresh

THE REMAINDER OF THE MENSTRUAL CYCLE
(excluding menses and premenses)

1.	meaningless	___	___	___	___	___	___	___	meaningful
2.	depressed	___	___	___	___	___	___	___	elevated
3.	fragrant	___	___	___	___	___	___	___	foul
4.	soothing	___	___	___	___	___	___	___	aggravating
5.	young	___	___	___	___	___	___	___	old
6.	fair	___	___	___	___	___	___	___	unfair
7.	stale	___	___	___	___	___	___	___	fresh
8.	tense	___	___	___	___	___	___	___	relaxed
9.	beautiful	___	___	___	___	___	___	___	ugly
10.	fortunate	___	___	___	___	___	___	___	unfortunate
11.	important	___	___	___	___	___	___	___	unimportant
12.	repelling	___	___	___	___	___	___	___	attracting
13.	tasty	___	___	___	___	___	___	___	distasteful
14.	peaceful	___	___	___	___	___	___	___	ferocious
15.	perfect	___	___	___	___	___	___	___	imperfect
16.	cruel	___	___	___	___	___	___	___	kind
17.	painful	___	___	___	___	___	___	___	pleasurable
18.	sociable	___	___	___	___	___	___	___	unsociable
19.	happy	___	___	___	___	___	___	___	sad
20.	dangerous	___	___	___	___	___	___	___	safe
21.	good	___	___	___	___	___	___	___	bad
22.	useless	___	___	___	___	___	___	___	useful
23.	sharp	___	___	___	___	___	___	___	dull
24.	heavenly	___	___	___	___	___	___	___	hellish
25.	sweet	___	___	___	___	___	___	___	bitter
26.	calm	___	___	___	___	___	___	___	agitated
27.	nice	___	___	___	___	___	___	___	awful

THE REMAINDER OF THE MENSTRUAL CYCLE
(excluding menses and premenses)

29.	positive	___	___	___	___	___	___	___	negative
30.	sick	___	___	___	___	___	___	___	healthy
31.	valuable	___	___	___	___	___	___	___	worthless
32.	empty	___	___	___	___	___	___	___	full
33.	graceful	___	___	___	___	___	___	___	awkward
34.	impure	___	___	___	___	___	___	___	pure
35.	comfortable	___	___	___	___	___	___	___	uncomfortable

APPENDIX 10

9TH REVISION ICD9 (1979) CODES USED FOR ALCOHOL RELATED DISORDERS

291 ALCOHOLIC PSYCHOSES

Organic psychotic states due mainly to excessive consumption of alcohol; defects of nutrition are thought to play an important role. In some of these states, withdrawal of alcohol can be of aetiological significance.

Excludes: alcoholism without psychosis (303)

291.0 Delirium tremens

Acute or subacute organic psychotic states in alcoholics, characterized by clouded consciousness, disorientation, fear, illusions, delusions, hallucinations of any kind, notably visual and tactile, and restlessness, tremor and sometimes fever.

Alcoholic delirium

291.1 Korsakov's psychosis, alcoholic

A syndrome of prominent and lasting reduction of memory span, including striking loss of recent memory, disordered time appreciation and confabulation, occurring in alcoholics as the sequel to an acute alcoholic psychosis (especially delirium tremens) or, more rarely, in the course of chronic alcoholism. It is usually accompanied by peripheral neuritis and may be associated with Wernicke's encephalopathy.

Alcoholic polyneuritic psychosis

Excludes: Korsakov's psychosis:
MOS (294.0)
nonalcoholic (294.0)

291.2 Other alcoholic dementia

Nonhallucinatory dementias occurring in association with alcoholism but not characterized by the features of either delirium tremens or Korsakov's psychosis.

Alcoholic dementia NOS
Chronic alcoholic brain syndrome

291.3 Other alcoholic hallucinosis

A psychosis usually of less than six months' duration, with slight or no clouding of consciousness and much anxious restlessness in which auditory hallucinations, mostly of voices uttering insults and threats, predominate.

Excludes: schizophrenia (295 -) and paranoid states (297 -) taking the form of chronic hallucinosis with clear consciousness in an alcoholic.

291.4 Pathological drunkenness

Acute psychotic episodes induced by relatively small amounts of alcohol. These are regarded as individual idiosyncratic reactions to alcohol, not due to excessive consumption and without conspicuous neurological signs of intoxication.

Excludes: simple drunkenness (305.0)

291.5 Alcoholic Jealousy

Chronic paranoid psychosis characterized by delusional jealousy and associated with alcoholism.

Alcoholic Paranoia

Excludes: nonalcoholic paranoid states (297. -)
schizophrenia, paranoid type (295.3)

291.8 Other

Alcohol withdrawal syndrome

Excludes: delirium tremens (291.0)

291.9 Unspecified

Alcoholic:

mania NOS
psychosis NOS

Alcoholism (chronic) with psychosis

303 ALCOHOL DEPENDENCE SYNDROME

A state, psychic and usually also physical, resulting from taking alcohol, characterized by behavioural and other responses that always include a compulsion to take alcohol on a continuous or periodic basis in order to experience its psychic effects, and sometimes to avoid the discomfort of its absence; tolerance may or may not be present. A person may be dependent on alcohol and other drugs; if so also make the appropriate 304 coding. If dependence is associated with alcoholic psychosis or with physical complications, both should be coded.

Acute drunkenness in alcoholism Dipsomania
Chronic alcoholism

Excludes: alcoholic psychoses (291. -)
drunkenness NOS (305.0)
physical complications of alcohol such as:
cirrhosis of liver (571.2)
epilepsy (345. -)
gastritis (535.3)
hepatic failure (571.3)

305 NONDEPENDENT ABUSE OF DRUGS

Includes cases where a person, for whom no other diagnosis is possible has come under medical care because of the maladaptive effect of a drug on which he is not dependent (as defined in 304.-) and that he ahs taken on his own initiative to the detriment of his health or social functioning. When drug abuse is secondary to a psychiatric disorder, code the disorder.

Excludes: alcohol dependence syndrome (303)
drug dependence (304.-)
drug withdrawal syndrome (292.0)
poisoning by drugs or medicaments (960 - 979)

305.0 Alcohol

Cases of acute intoxication or "hangover" effects.

Drunkenness NOS "Hangover" (alcohol)
Excessive drinking of alcohol NOS Inebriety NOS

Excludes: alcoholic psychoses (291.-)
physical complications of alcohol, such as:
cirrhosis of liver (571.2)
epilepsy (345.-)
gastritis (535.3)

425.5 ALCOHOLIC CARDIOMYOPATHY

535.3 ALCOHOLIC GASTRITIS

571 CHRONIC LIVER DISEASE AND CIRRHOSIS

571.0 Alcoholic fatty liver

571.1 Acute alcoholic hepatitis

571.2 Alcoholic cirrhosis of liver
Laennec's cirrhosis

571.3 Alcoholic liver damage, unspecified

E860 ACCIDENTAL POISONING BY ALCOHOL, NOT ELSEWHERE CLASSIFI

E860.0 Alcoholic beverages

Alcohol in preparations intended for consumption

E860.1 Other and unspecified ethyl alcohol and its products

Denatured alcohol Grain alcohol NOS
Ethanol NOS

E860.2 Methyl alcohol

Methanol
Methylated spirit
Wood alcohol

E860.3 Isopropyl alcohol

Dimethylcarbinol Secondary propyl alcohol
Isopropanol
Rubbing alcohol substitute

E860.4 Fusel Oil

amyl
butyl
propyl

E860.8 Other

E860.9 Unspecified

E980 POISONING BY SOLID OR LIQUID SUBSTANCES, UNDETERMINED WHETHER ACCIDENTALLY OR PURPOSELY INFLICTED

APPENDIX 11

TIME SERIES ANALYSIS

A time series is a sequence of measurements made at regular time intervals. The goal of the analysis of one or more time series may be either to gain a descriptive statistic or to build and verify a predictive model. The former is referred to as a frequency domain (or spectral) approach; the latter is a time domain (finite parameter or Box Jenkins) approach.

The underlying concept of spectral analysis is that each variable, thought of as a time series, or function over time can be meaningfully represented by pure sine waves summed over different frequencies with a different amplitude and phase at each frequency.

Fourier analysis is a time honored technique in which time series are reduced to their sinusoid components. Spectral analysis is then applied to assess how much of the variation in the data arises from various frequency bands. Spectral analysis proceeds by Fourier transforming the data to obtain coefficients of the sinusoids at a discrete set of frequencies, grouping neighbouring frequencies into frequency bands and estimating various quantities from the Fourier transformed data into one frequency band at a time.

The spectral density of a variable is estimated by computing the average squared amplitude of the sinusoids within a frequency band. This estimated spectral density is then plotted as a function of frequency. The spectral density plotted as a logrythmic scale gives the distribution of the variance of the data over different frequency bands. The first largest peak presented in spectral analysis corresponds to the periodic character of the data. The time period is indicated by reading the frequency at that peak. For example, in the case of this study, a peak at a frequency of .10 corresponds to a 10-day periodic character of the data.

Bivariate frequency domain analysis.

Pairs of variables may be similarly analyzed. The aim is to see in which frequency bands two variables have coherence. Coherence is the measure of linear association between two variables in different frequency bands. The coherence spectrum gives the square of the correlation between random amplitudes for the two series at each frequency. An analog of the regression is sought to seek asymmetry.

Bivariate analysis provides another additional piece of information, the phase spectrum which describes the lead-lag relationship at each frequency. If in two series, as in the case of this study, X denotes drinking and Y denotes symptoms, and 'X' the input series shows a negative phase, it could be interpreted to mean that drinking is leading and symptoms are a response to drinking when considering cyclicity at a specific frequency.

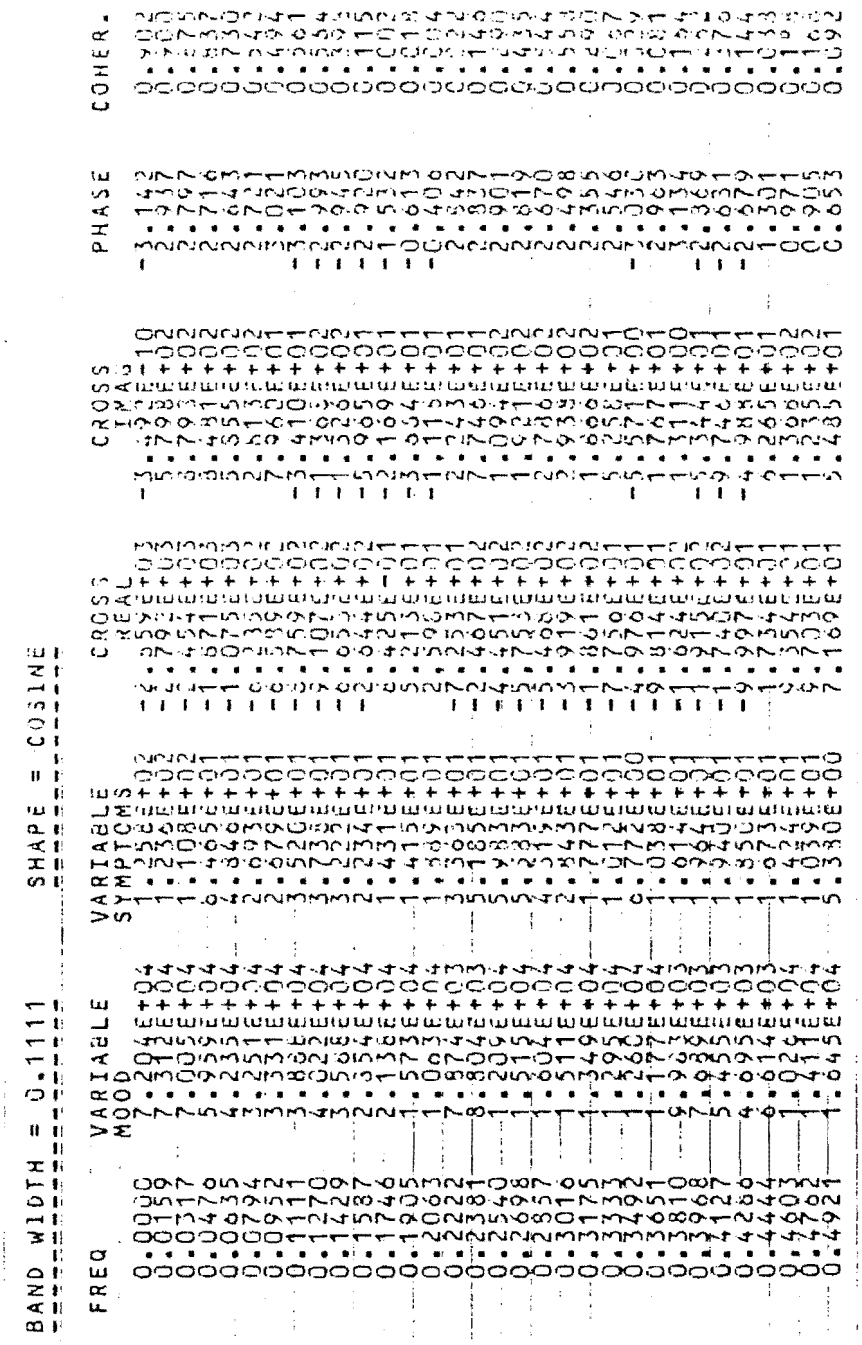
If the ratio is zero, the series are perfectly in phase and synchronous. The phase is examined in those places when individual spectral densities peak at the same frequency. A positive slope indicates Y leads, a negative slope indicates X leads. The phase spectrum is only interpretable when the coherence is high.

To summarize, spectral density estimates are examined to find which cyclicities dominate the series. Regions of high coherence indicate cross-correlation at these frequencies, but do not control directly for autocorrelation. In such regions the phase spectrum can indicate asymmetric time delays. This analysis does not control specifically for autocorrelation.

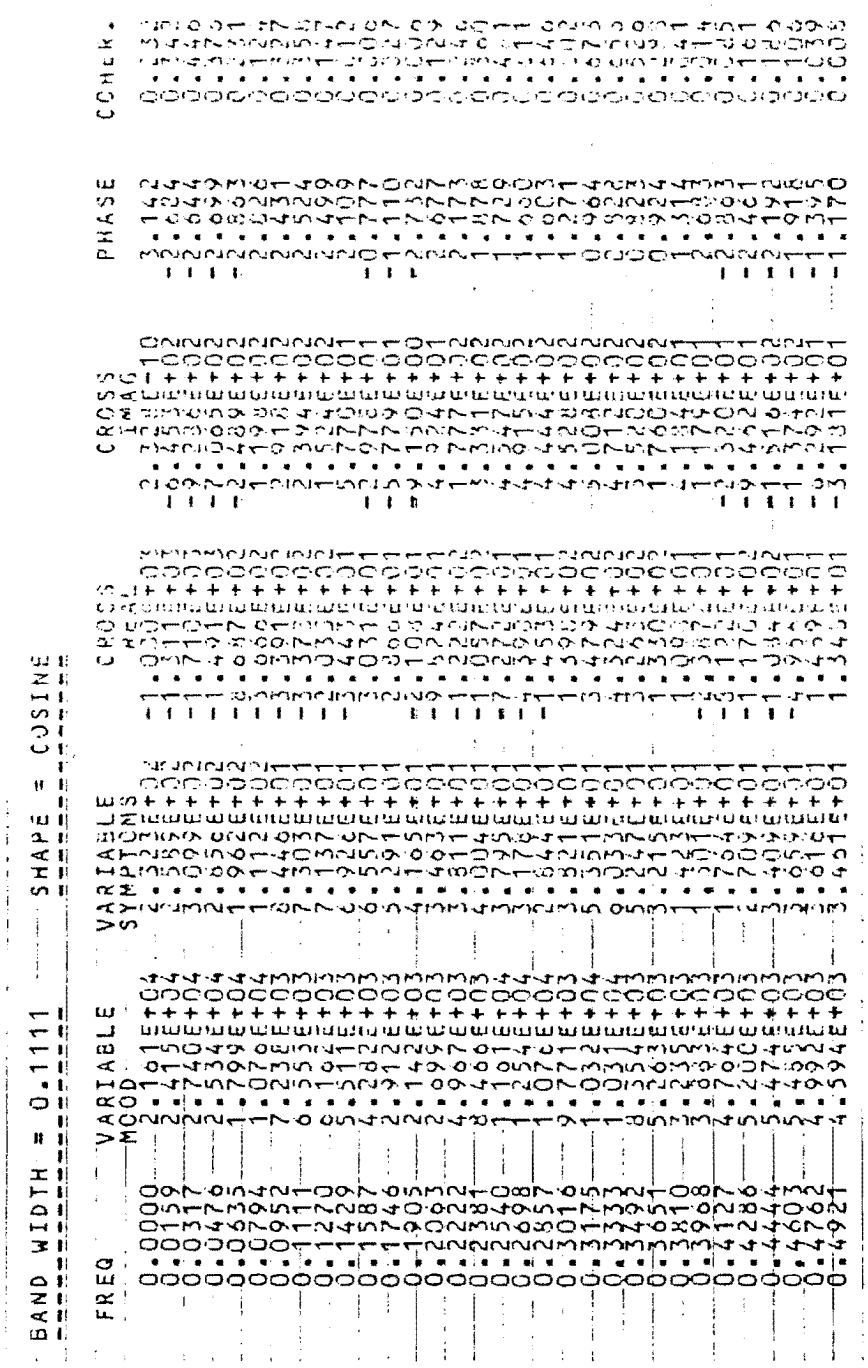
APPENDIX 12

Results of a bivariate analysis for the variables mood and symptoms (total score) for subjects 3-10.

Subject 3


BAND WIDTH = 0.1111
SHAPE = COSINE
FREQ
VARIABLE MOD
VARIABLE SYMPTOMS
CROSS REAL
CROSS IMAG
CROSS PHASE
COHER.

Subject 4


BAND WIDTH = 0.1111
SHAPE = COSINE
FREQ
VARIABLE
MOD
VARIABLE
SYMPTOMS
CROSS
CROSS
CROSS
PHASE
CHECK

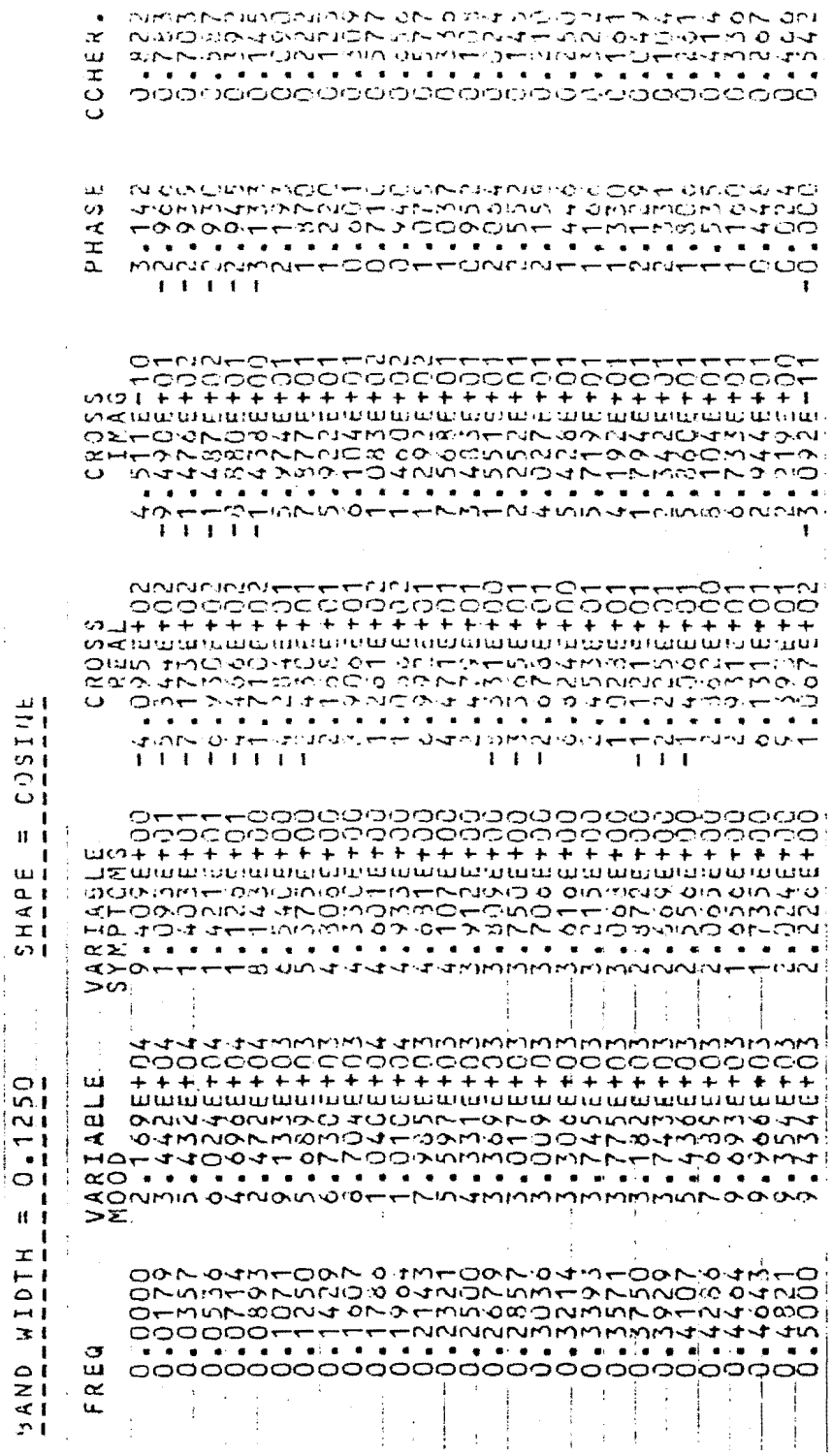
AND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE SYMPTOMS	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	3.233E+03	3.304E+01	-4.695E+01	2.910E-11	3.142	0.022
0.0159	3.569E+03	3.203E+01	-3.856E+01	-1.290E+02	-1.861	0.152
0.0317	4.959E+03	2.979E+01	-5.234E+01	-1.365E+02	-1.937	0.145
0.0476	6.859E+03	2.392E+01	-1.026E+02	3.478E+00	3.108	0.053
0.0635	9.385E+03	2.312E+01	-1.472E+02	1.506E+02	2.347	0.139
0.0794	1.224E+04	1.959E+01	-1.336E+02	1.945E+02	2.173	0.[illegible]
0.0952	1.371E+04	1.163E+01	-5.395E+01	1.335E+02	1.955	0.[illegible]
0.1111	1.250E+04	8.078E+00	2.605E+01	1.569E+01	0.542	0.[illegible]
0.1270	9.950E+03	1.067E+01	1.338E+01	-2.348E+01	-1.133	0.[illegible]
0.1429	7.197E+03	1.447E+01	-5.666E+01	1.760E-01	3.142	0.[illegible]
0.1587	5.317E+03	1.430E+01	-1.109E+02	4.035E+01	2.793	0.[illegible]
0.1746	4.164E+03	1.017E+01	-1.092E+02	5.940E+01	2.644	0.[illegible]
0.1905	4.322E+03	6.200E+00	-1.057E+02	4.177E+01	2.765	0.[illegible]
0.2063	5.294E+03	8.770E+00	-1.088E+02	-5.230E+00	-3.094	0.[illegible]
0.2222	6.036E+03	9.450E+00	-1.060E+02	-2.710E+01	-2.891	0.[illegible]
0.2381	5.281E+03	1.055E+01	-7.842E+01	-3.824E+01	-2.663	0.[illegible]
0.2540	3.413E+03	9.415E+00	-4.227E+01	-3.064E+01	-2.514	0.[illegible]
0.2698	1.696E+03	7.052E+00	-2.175E+01	-9.430E+00	-2.748	0.[illegible]
0.2857	1.273E+03	5.668E+00	-3.345E+01	1.430E+01	2.732	0.[illegible]
0.3016	1.417E+03	5.650E+00	-3.309E+01	1.213E+01	2.788	0.[illegible]
0.3175	2.156E+03	6.101E+00	-2.914E+01	-1.510E+01	-2.659	0.[illegible]
0.3333	3.197E+03	7.903E+00	-4.135E+01	-4.061E+01	-2.376	0.[illegible]
0.3492	3.816E+03	8.714E+00	-5.902E+01	-2.649E+01	-2.702	0.[illegible]
0.3651	3.700E+03	8.079E+00	-6.597E+01	1.112E+01	2.975	0.[illegible]
0.3810	3.135E+03	5.824[illegible]E+00	-5.209E+01	4.555E+01	2.419	0.[illegible]
0.3968	2.555E+03	3.200E+00	-2.089E+01	4.422E+01	1.117	0.[illegible]
0.4127	2.483E+03	1.951E+00	-8.332E+00	1.749E+01	1.505	0.[illegible]
0.4286	3.122E+03	3.035E+00	-6.470E+00	7.299E+00	3.029	0.[illegible]
0.4444	3.806E+03	4.826E+00	-1.095E+02	1.369E+01	3.017	0.[illegible]
0.4603	3.919E+03	6.305E+00	-1.090E+02	2.291E+01	2.949	0.[illegible]
0.4762	3.224E+03	6.375E+00	-5.445E+01	2.277E+01	2.732	0.[illegible]
0.4921	2.206E+03	9.573E+00	5.321E+00	-1.273E+01	1.175	0.[illegible]

BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE SYMPTOMS	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	1.005E+04	1.125E+01	-2.902E+02	-4.366E-11	-3.142	0.745
0.0159	1.013E+04	1.447E+01	-3.303E+02	4.457E+01	3.007	0.755
0.0317	9.659E+03	2.051E+01	-3.647E+02	5.939E+01	2.988	0.792
0.0476	7.809E+03	2.229E+01	-3.557E+02	5.166E+01	2.997	0.742
0.0635	5.085E+03	1.832E+01	-2.505E+02	3.321E+01	3.010	0.667
0.0794	3.534E+03	1.288E+01	-1.694E+02	1.292E+01	3.063	0.597
0.0952	3.557E+03	1.054E+01	-1.588E+02	-7.089E+00	-3.097	0.672
0.1111	3.851E+03	1.043E+01	-1.819E+02	-2.727E+01	-2.993	0.843
0.1270	3.416E+03	9.057E+00	-1.705E+02	-3.091E+01	-2.962	0.910
0.1429	2.415E+03	7.042E+00	-1.209E+02	-2.217E+01	-2.960	0.889
0.1587	1.464E+03	4.645E+00	-7.461E+01	-4.916E+00	-3.066	0.818
0.1746	9.952E+02	3.667E+00	-5.719E+01	1.332E+01	2.686	0.691
0.1905	1.088E+03	3.489E+00	-1.452E+01	2.166E+01	2.161	0.160
0.2063	1.144E+03	3.140E+00	-7.059E+00	1.530E+01	2.003	0.079
0.2222	9.758E+02	2.916E+00	-2.835E+00	2.970E+00	2.342	0.077
0.2381	7.834E+02	2.353E+00	-1.292E+00	-3.239E+00	-1.775	0.022
0.2540	8.457E+02	2.926E+00	0.446E+03	-2.372E+00	-0.353	0.019
0.2698	1.032E+03	3.334E+00	2.048E+01	5.087E+00	0.244	0.125
0.2857	1.204E+03	3.751E+00	3.042E+01	1.302E+01	0.459	0.365
0.3016	1.230E+03	4.079E+00	4.592E+01	2.773E+01	0.544	0.574
0.3175	1.083E+03	4.175E+00	3.898E+01	2.663E+01	0.599	0.495
0.3333	8.354E+02	3.918E+00	2.433E+01	1.517E+01	0.558	0.351
0.3492	5.718E+02	3.352E+00	1.343E+01	5.063E+00	0.360	0.180
0.3651	4.028E+02	2.331E+00	0.140E+00	4.160E-01	0.068	0.040
0.3810	6.035E+02	1.413E+00	0.097E+00	1.929E+00	0.306	0.043
0.3968	1.062E+03	7.405E-01	0.587E+00	-1.549E+00	-0.231	0.033
0.4127	1.570E+03	0.523E-01	2.103E-01	-4.249E+00	-1.521	0.018
0.4286	1.769E+03	8.608E-01	-0.671E+00	-2.779E+00	-2.747	0.034
0.4444	1.520E+03	1.177E+00	-9.230E+00	1.272E+00	3.005	0.043
0.4603	1.105E+03	1.350E+00	-9.312E+00	2.606E+00	2.869	0.063
0.4762	8.774E+02	1.351E+00	-9.003E+00	1.712E+00	2.954	0.071
0.4921	8.129E+02	1.351E+00	-8.712E+00	-1.834E-01	-3.121	0.069

Subject 7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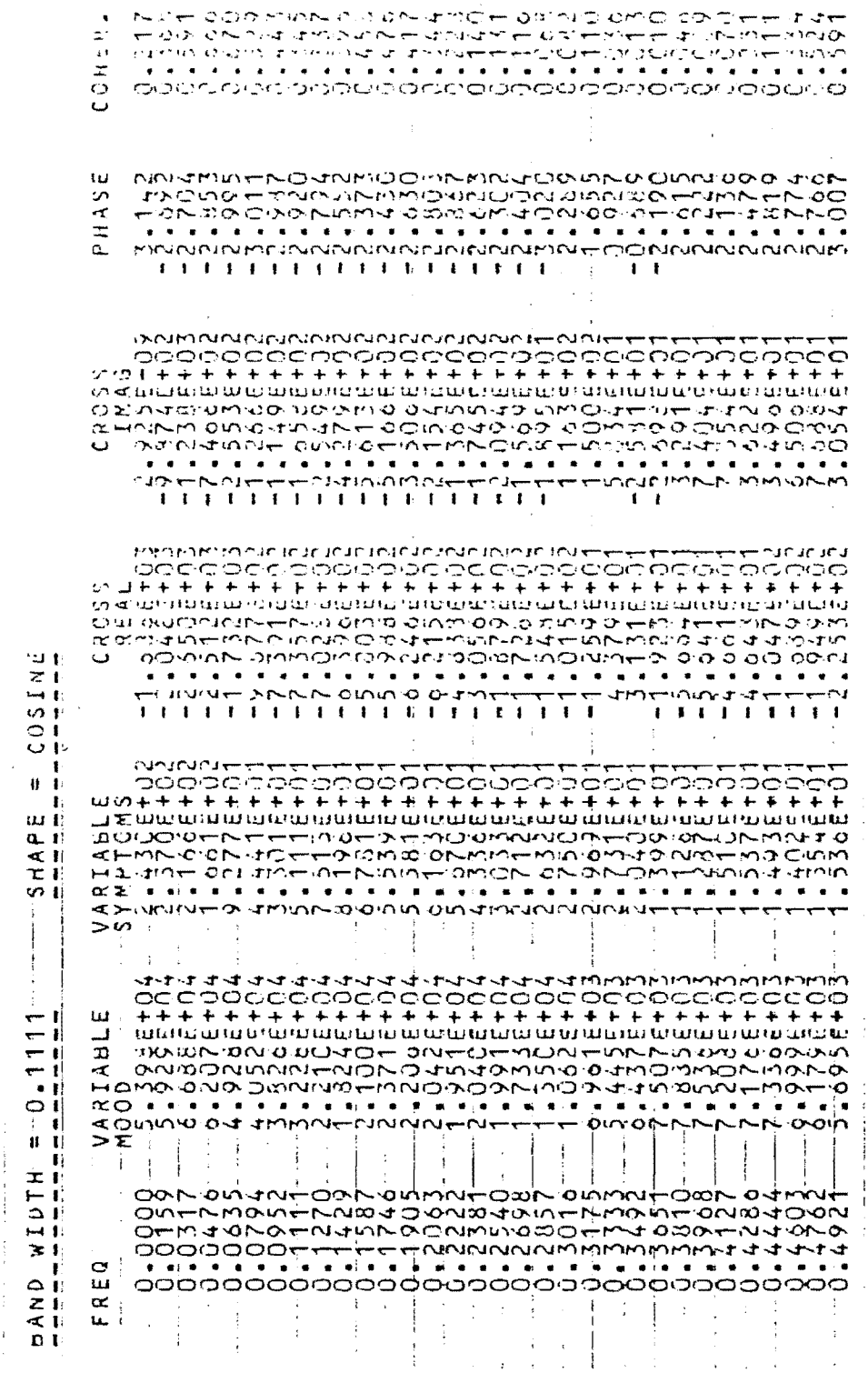
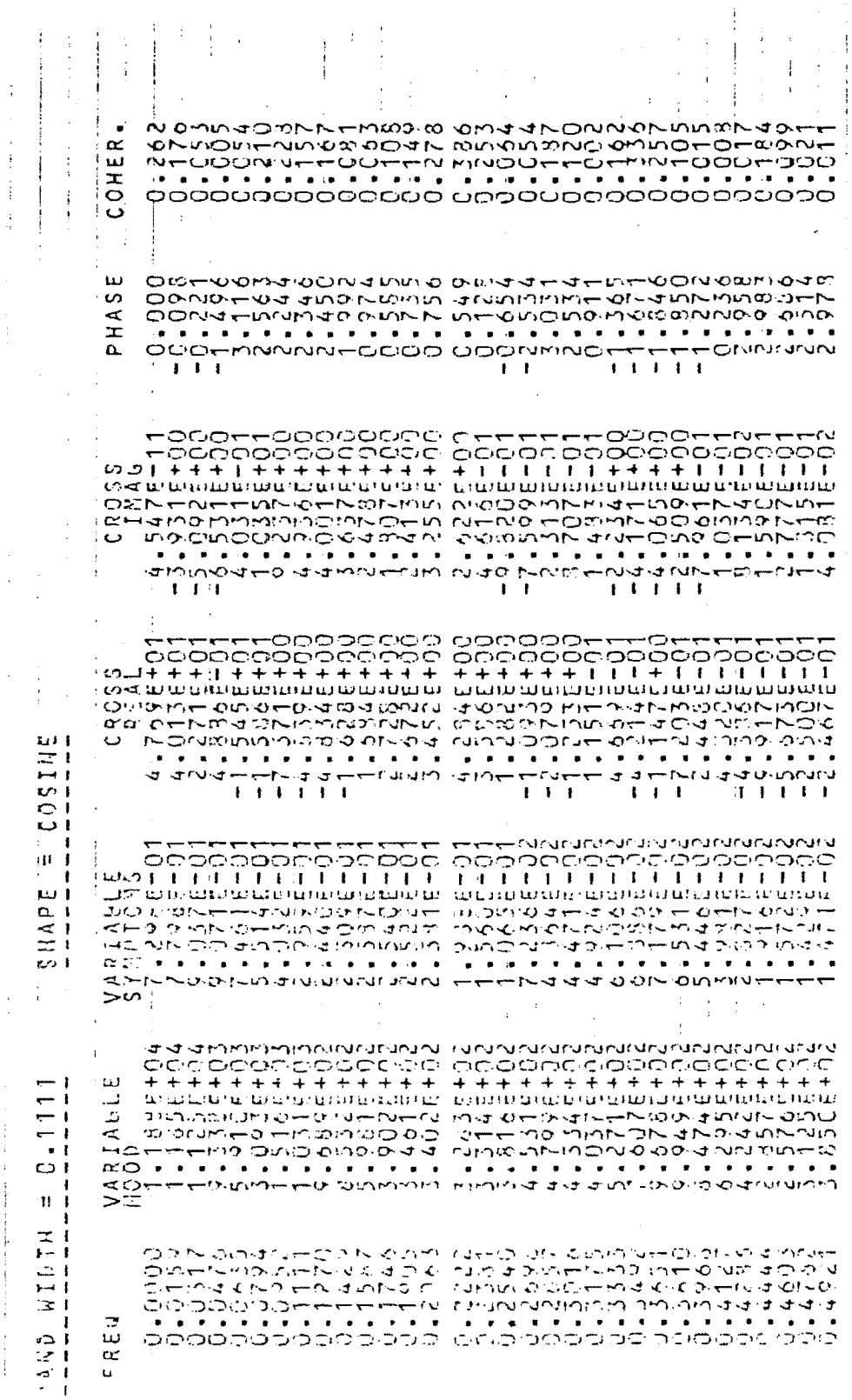
SHAPE = COSINE
FREQ
VARIABLE MOD
VARIABLE SYM
CROSS PHASE
CROSS COHER.

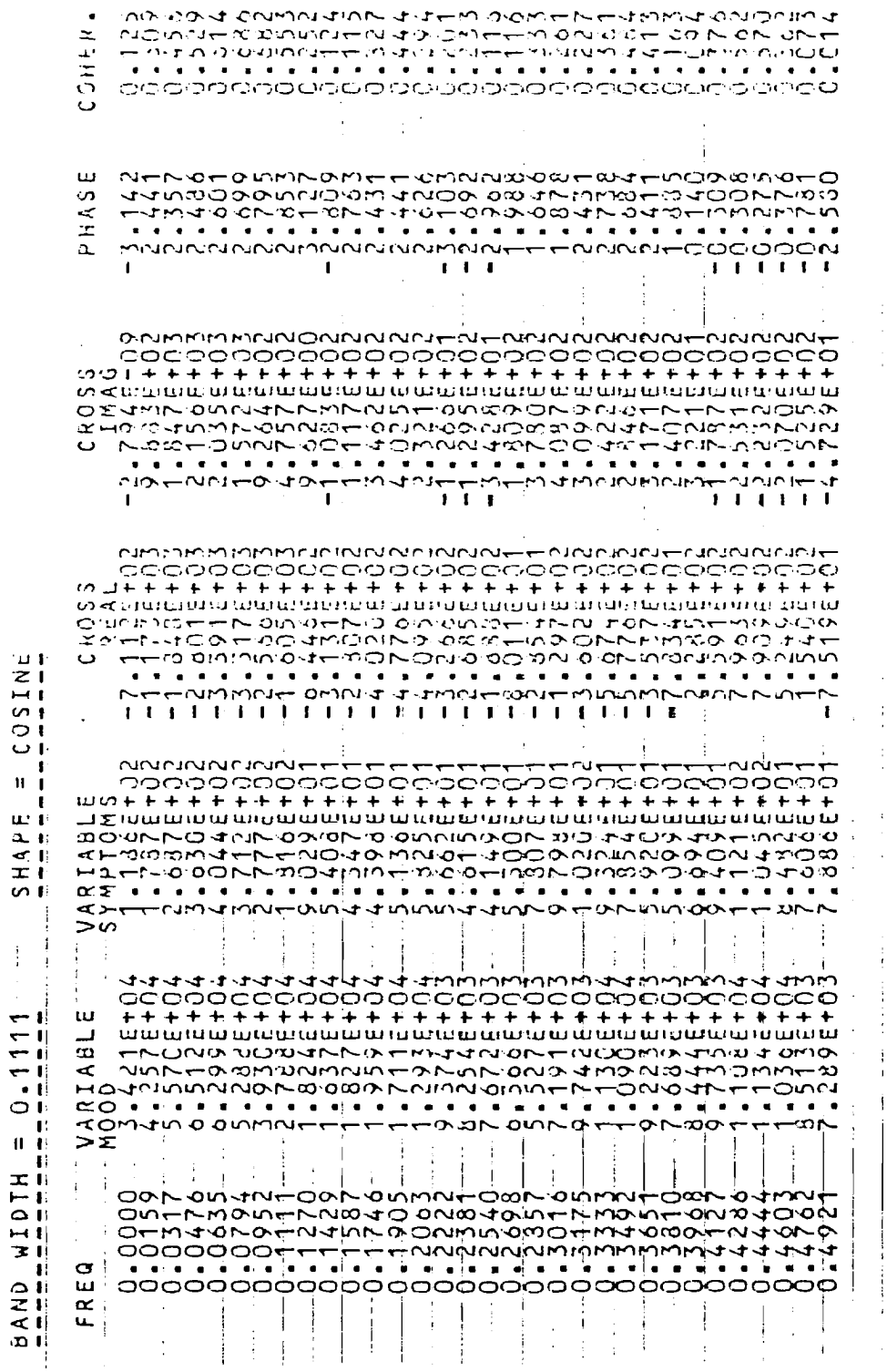
Subject 8


BAND WIDTH = 0.1111 SHAPE = COSINE
FREQ
VARIABLE MODE
VARIABLE SYMBOLS
CROSS SPECTRAL
CROSS SPECTRAL
PHASE
COHER.

Subject 9


BAND WIDTH = 0.1111
SHAPE = COSINE
FREQ
VARIABLE
MODE
VARIABLE
SYM
CROSS
SIGNAL
CROSS
IMAG
PHASE
COHER.

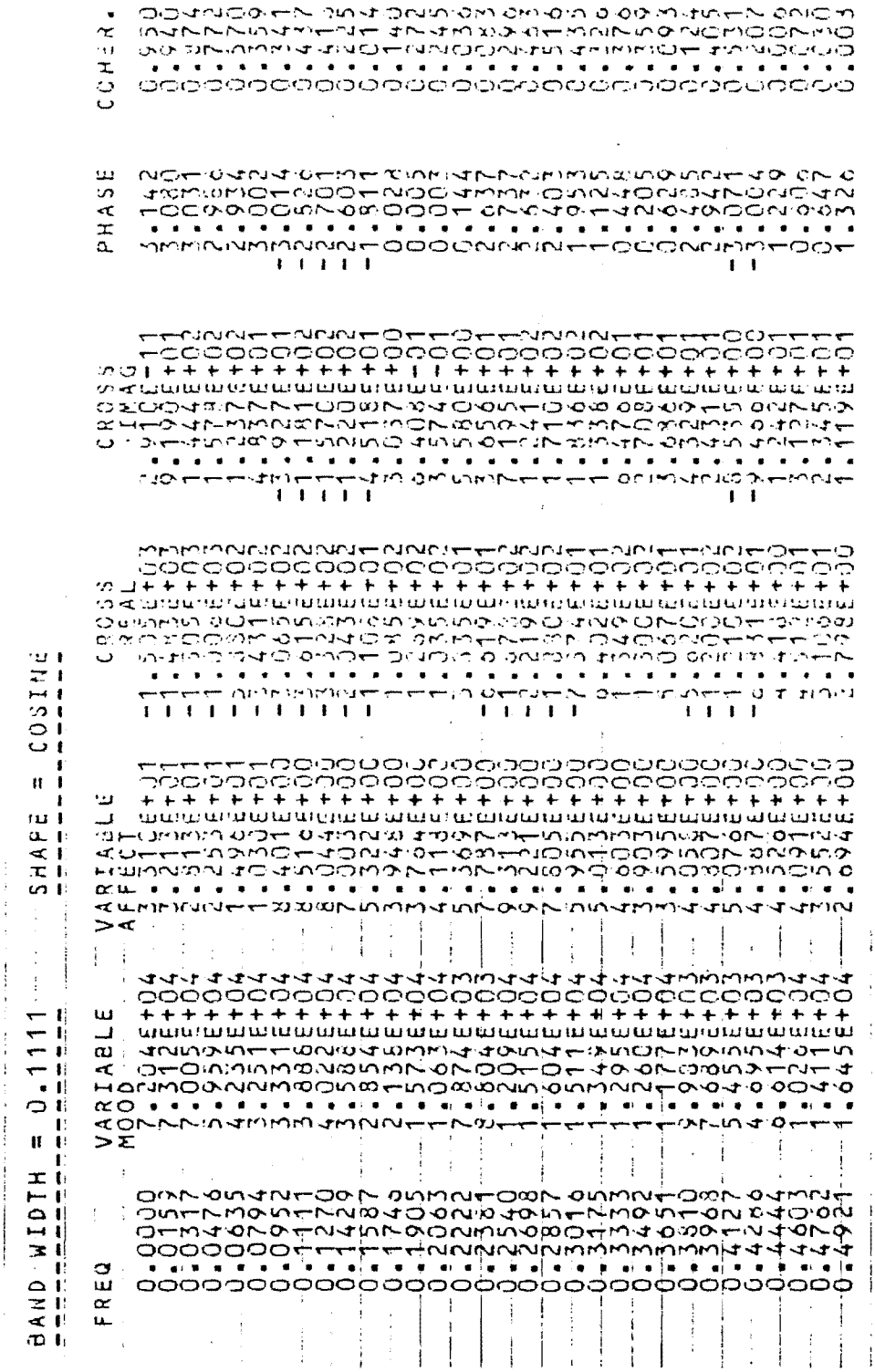
Subject 10


BAND WIDTH = 0.1111
SHAPE = COSINE
FREQ
VARIABLE MODALITY
VARIABLE SYMPTOMS
CROSS SPECTRAL
CROSS IMAGINARY
PHASE
COHER.

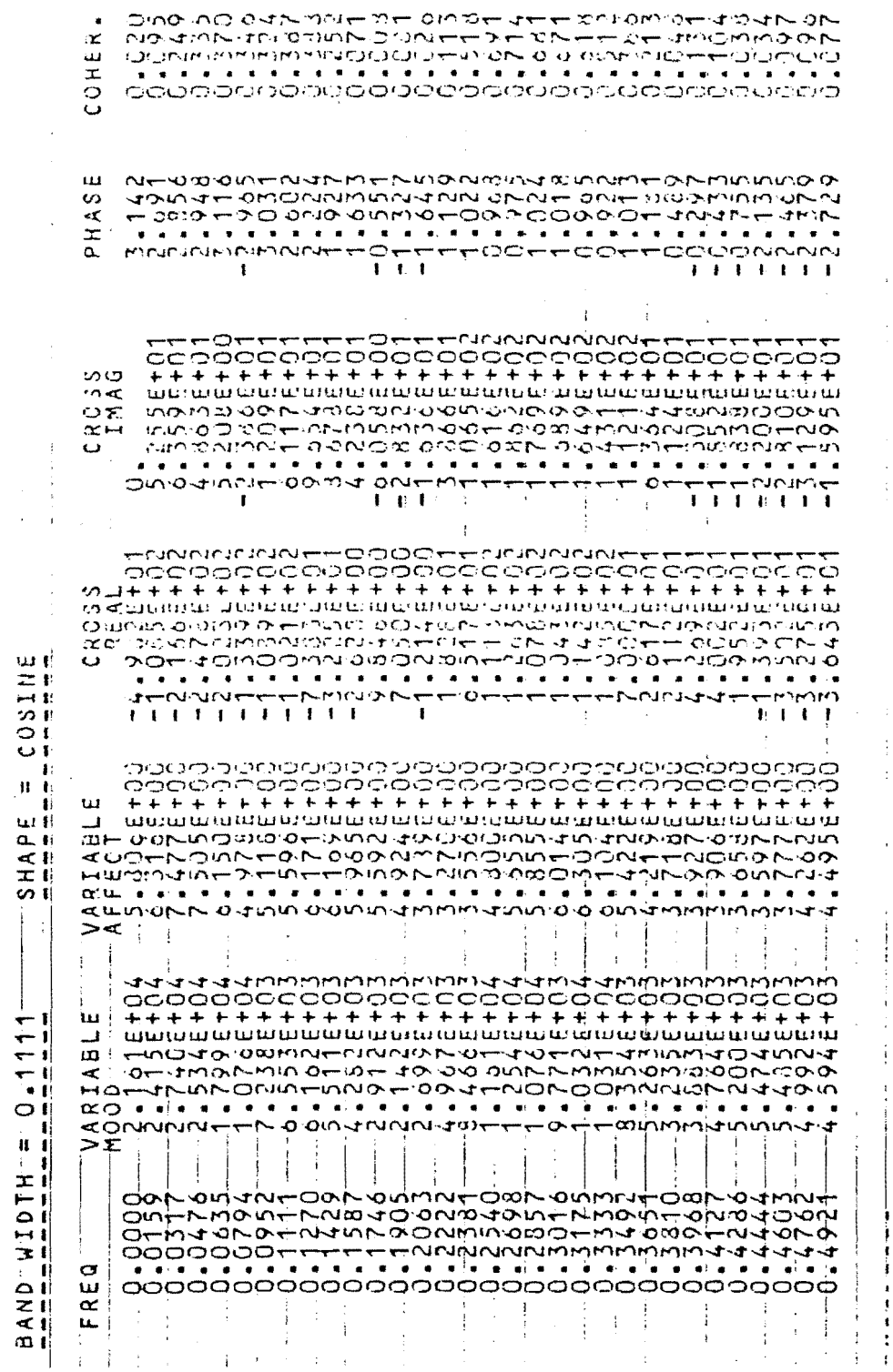
APPENDIX 13

Results of a bivariate analysis for the variables mood and negative affect for subjects 3-10.

Subject 3


BAND WIDTH = 0.1111
SHAPE = COSINE
FREQ
VARIABLE
MOD
VARIABLE
AFF
CROSS
REAL
CROSS
IMAG
PHASE
COHER.

Subject 4


BAND WIDTH = 0.1111 SHAPE = COSINE
FREQ
MOD
VARIABLE
AFFECT
VARIABLE
CROSS
CROSS
IMAG
PHASE
COHER.

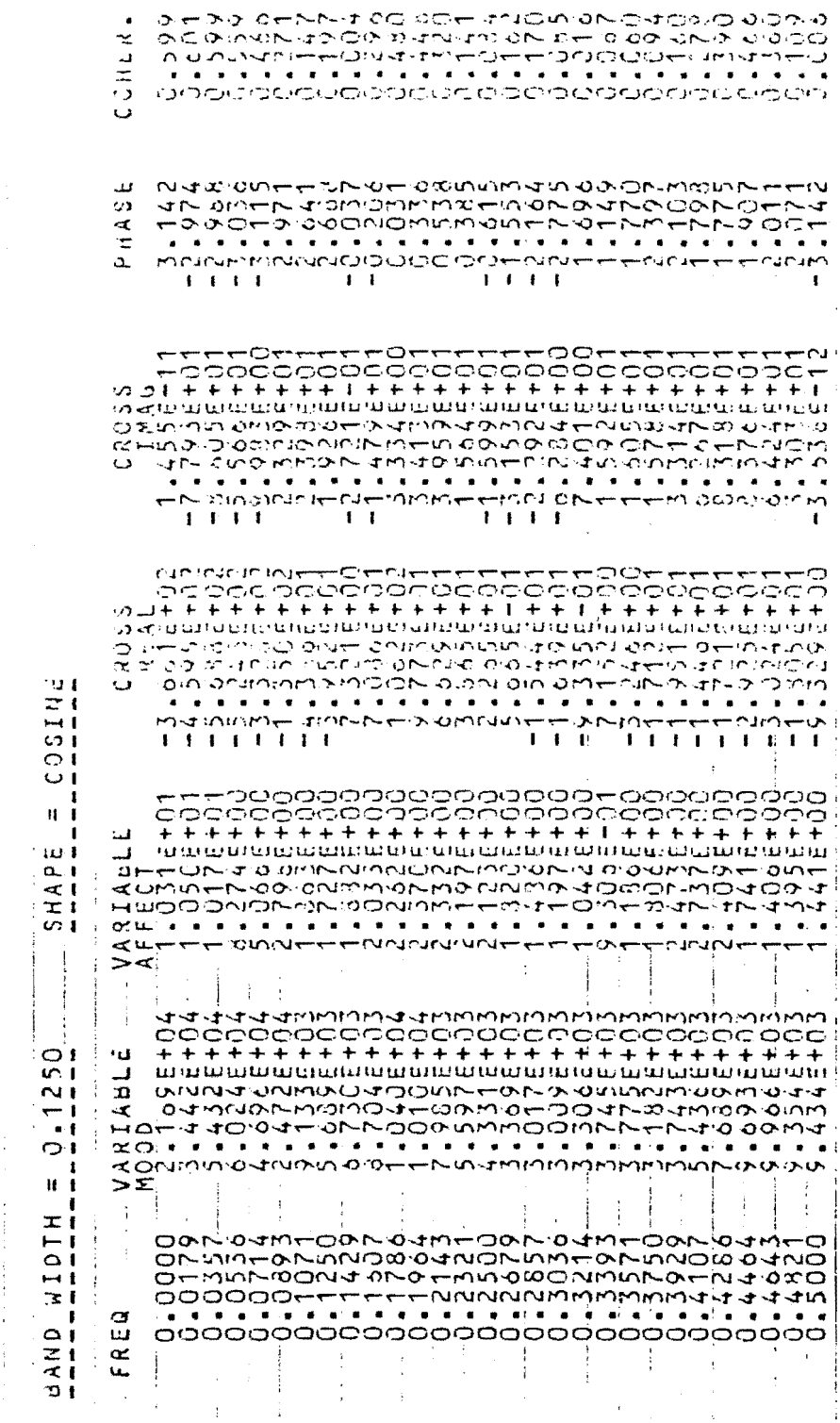
BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE AFFECT	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	3.233E+03	6.192E+00	-5.193E+01	-7.276E-12	-3.142	0.135
0.0159	3.569E+03	5.618E+00	-4.975E+01	-5.177E+01	-2.729	0.147
0.0317	4.959E+03	4.626E+00	-6.224E+01	-1.604E+01	-2.560	0.153
0.0476	6.859E+03	4.048E+00	-6.807E+01	2.104E+01	2.907	0.195
0.0635	9.385E+03	3.396E+00	-1.015E+02	4.516E+01	2.698	0.295
0.0794	1.224E+04	2.874E+00	-8.136E+01	4.414E+01	2.645	0.244
0.0952	1.371E+04	1.957E+00	-3.645E+01	2.153E+01	2.608	0.067
0.1111	1.250E+04	1.484E+00	5.950E-01	-1.293E+01	-1.525	0.009
0.1270	9.950E+03	1.971E+00	-7.977E+00	-2.261E+01	-1.910	0.029
0.1429	7.197E+03	2.681E+00	-3.680E+01	-1.235E+01	-2.818	0.078
0.1587	5.317E+03	2.856E+00	-5.336E+01	3.985E-01	3.134	0.138
0.1746	4.104E+03	2.396E+00	-4.033E+01	1.252E+01	2.872	0.231
0.1905	4.322E+03	1.868E+00	-4.339E+01	1.496E+01	2.810	0.261
0.2063	5.294E+03	2.224E+00	-4.493E+01	3.760E+00	3.058	0.172
0.2222	6.036E+03	3.236E+00	-4.699E+01	8.532E-01	3.123	0.113
0.2381	5.251E+03	4.005E+00	-4.135E+01	-2.016E+00	3.093	0.081
0.2540	3.413E+03	4.101E+00	-3.315E+01	1.203E+01	2.778	0.090
0.2698	1.696E+03	3.423E+00	-2.661E+01	2.561E+01	2.375	0.235
0.2857	1.273E+03	2.606E+00	-3.862E+01	3.309E+01	2.284	0.377
0.3016	1.417E+03	2.054E+00	-2.276E+01	2.723E+01	2.267	0.430
0.3175	2.156E+03	1.697E+00	-2.029E+01	1.422E+01	2.530	0.168
0.3333	3.197E+03	1.518E+00	-2.725E+01	4.038E+00	2.994	0.156
0.3492	3.816E+03	1.488E+00	-3.653E+01	4.452E+00	3.020	0.153
0.3651	3.700E+03	1.369E+00	-4.075E+01	7.495E+00	2.960	0.339
0.3810	3.135E+03	1.169E+00	-3.391E+01	1.051E+01	2.841	0.445
0.3968	2.555E+03	8.423E-01	-1.749E+01	5.475E+00	2.833	0.463
0.4127	2.483E+03	5.849E-01	-7.156E+00	-3.275E+00	-2.713	0.433
0.4286	3.122E+03	5.709E-01	-1.458E+01	-4.139E+00	-2.862	0.129
0.4444	3.808E+03	6.403E-01	-2.849E+01	-2.212E+00	-3.064	0.075
0.4603	3.919E+03	8.352E-01	-3.075E+01	-3.002E+00	-3.044	0.096
0.4762	3.224E+03	1.296E+00	-1.391E+01	-1.747E+00	-3.017	0.124
0.4921	2.200E+03	1.569E+00	6.736E+00	-6.145E-01	-0.090	0.013

BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE AFFECT	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	1.005E+04	2.647E+00	-1.233E+02	7.276E-12	3.142	0.942
0.0159	1.013E+04	2.372E+00	-1.737E+02	-5.466E+00	-3.093	0.826
0.0317	9.659E+03	5.004E+00	-1.937E+02	-9.333E+00	-3.093	0.779
0.0476	7.809E+03	6.116E+00	-1.520E+02	-2.132E+00	-3.130	0.894
0.0635	5.085E+03	6.220E+00	-1.405E+02	-1.885E+00	-3.128	0.824
0.0794	3.534E+03	5.723E+00	-1.056E+02	-1.748E+01	-2.979	0.577
0.0952	3.557E+03	5.194E+00	-1.017E+02	-4.189E+01	-2.751	0.655
0.1111	3.851E+03	4.659E+00	-1.050E+02	-5.783E+01	-2.638	0.601
0.1270	3.416E+03	3.875E+00	-9.135E+01	-5.295E+01	-2.616	0.542
0.1429	2.415E+03	2.806E+00	-6.042E+01	-3.557E+01	-2.610	0.711
0.1587	1.464E+03	2.107E+00	-2.322E+01	-1.857E+01	-2.560	0.370
0.1746	9.958E+02	1.591E+00	-8.142E+00	-2.700E+00	-2.821	0.046
0.1905	1.036E+03	1.154E+00	-4.592E+00	3.613E+00	2.042	0.075
0.2063	1.144E+03	6.554E-01	-4.639E+00	1.106E+01	1.972	0.193
0.2222	9.758E+02	2.651E-01	-5.120E+00	7.114E+00	2.195	0.097
0.2381	7.334E+02	1.148E-01	-3.998E+00	1.161E+00	2.854	0.193
0.2540	8.457E+02	7.606E-02	-3.138E+00	-1.629E+00	-2.668	0.198
0.2698	1.032E+03	1.075E-01	-2.913E+00	-2.761E+00	-2.363	0.145
0.2857	1.204E+03	1.365E-01	-3.063E+00	-1.620E+00	-2.656	0.154
0.3016	1.230E+03	3.037E-01	-1.820E+00	2.492E+00	2.202	0.220
0.3175	1.083E+03	4.365E-01	-5.300E-01	7.774E+00	1.639	0.115
0.3333	8.354E+02	6.573E-01	-3.372E-01	9.821E+00	1.605	0.175
0.3492	5.718E+02	7.071E-01	-1.173E+00	5.929E+00	1.739	0.122
0.3651	4.028E+02	5.952E-01	-1.973E+00	1.294E+00	2.566	0.024
0.3810	6.035E+02	3.723E-01	-2.105E+00	-2.309E+00	-2.314	0.055
0.3968	1.062E+03	2.032E-01	-2.467E+00	-3.566E+00	-2.265	0.100
0.4127	1.570E+03	2.190E-01	-3.723E+00	-7.089E-01	-3.060	0.023
0.4286	1.769E+03	3.306E-01	-1.437E+01	2.851E+00	2.950	0.022
0.4444	1.520E+03	4.501E-01	-1.527E+01	4.950E+00	2.837	0.044
0.4603	1.105E+03	6.207E-01	-1.311E+01	5.754E+00	2.776	0.073
0.4762	8.774E+02	8.696E-01	-1.745E+01	4.037E+00	2.914	0.121
0.4921	6.129E+02	1.066E+00	-2.136E+01	1.309E+00	3.080	0.528

Subject 7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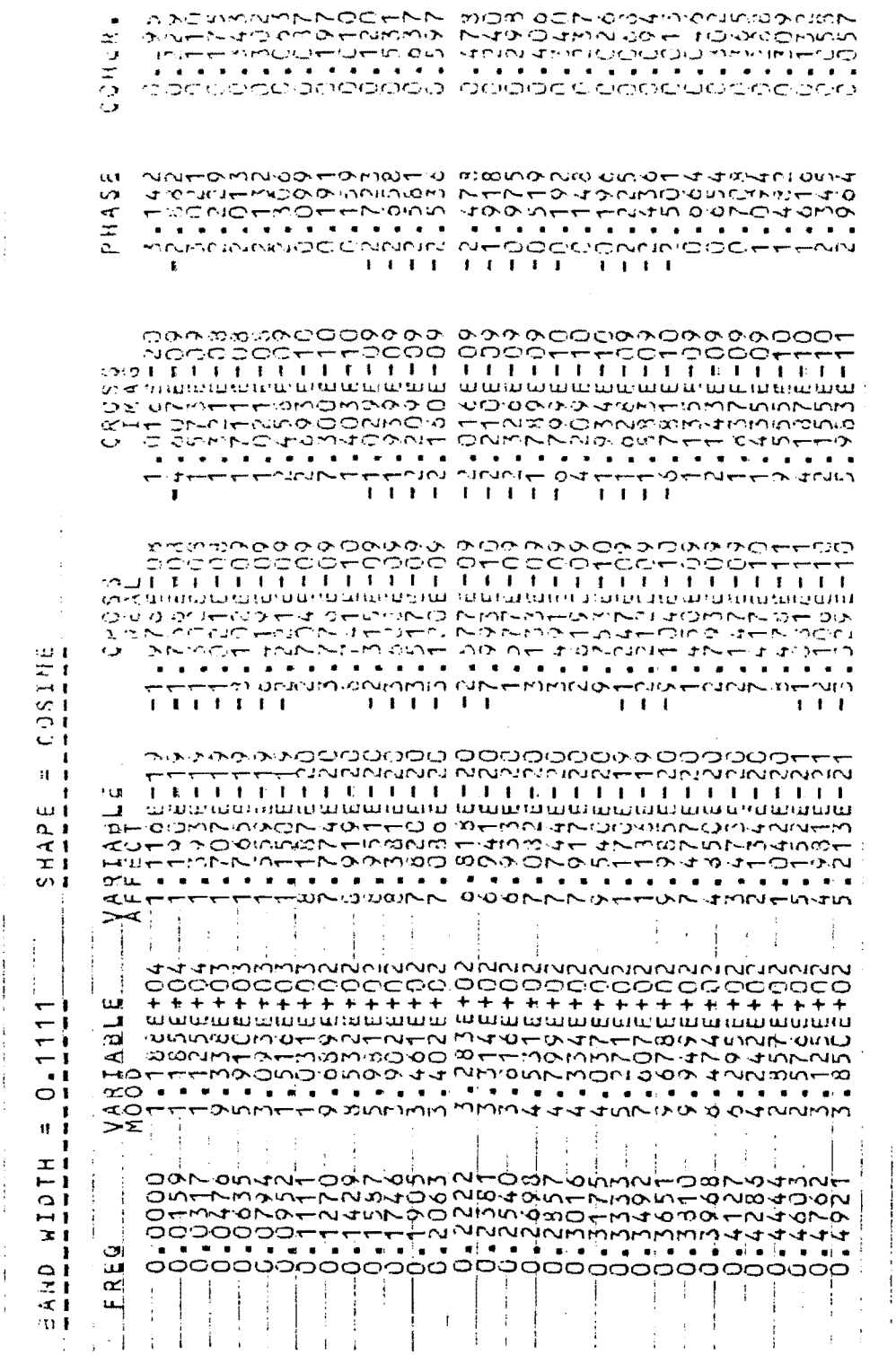
FREQ
VARIABLE MOD
VARIABLE AFFECT
CROSS SPECTRAL
CROSS IMAG-11
PHASE
COHER.

BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE AFFECT	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	5.398E+04	4.357E+00	-4.477E+02	2.910E-11	3.142	0.552
0.0159	5.929E+04	4.419E+00	-4.649E+02	-5.285E+00	-3.125	0.779
0.0317	6.688E+04	4.464E+00	-4.813E+02	5.061E+01	3.078	0.774
0.0476	6.207E+04	4.149E+00	-4.251E+02	3.280E+01	2.949	0.680
0.0635	4.928E+04	4.411E+00	-3.703E+02	1.033E+02	2.870	0.680
0.0794	4.052E+04	6.666E+00	-4.143E+02	5.696E+01	2.937	0.715
0.0952	3.826E+04	9.797E+00	-5.131E+02	6.796E+01	3.010	0.736
0.1111	3.228E+04	1.208E+01	-5.331E+02	5.180E+01	3.045	0.723
0.1270	2.210E+04	1.205E+01	-4.335E+02	1.867E+01	3.099	0.733
0.1429	1.824E+04	9.553E+00	-2.389E+02	-9.247E+00	-3.110	0.227
0.1587	2.100E+04	6.474E+00	-1.757E+02	-6.087E+00	-3.107	0.154
0.1746	2.371E+04	4.445E+00	-1.233E+02	3.070E+01	2.898	0.192
0.1905	2.206E+04	3.444E+00	-1.041E+02	6.142E+01	2.660	[illegible]
0.2063	2.042E+04	3.343E+00	-1.025E+02	5.931E+01	2.700	[illegible]
0.2222	1.951E+04	3.541E+00	-1.075E+02	3.194E+01	2.911	[illegible]
0.2381	2.040E+04	3.637E+00	-1.124E+02	-6.391E+00	-3.090	0.237
0.2540	1.991E+04	3.511E+00	-1.066E+02	-4.434E+01	-2.802	[illegible]
0.2698	1.733E+04	3.417E+00	-1.027E+02	-7.205E+01	-2.622	[illegible]
0.2857	1.350E+04	3.676E+00	-1.173E+02	-6.677E+01	-2.682	[illegible]
0.3016	1.062E+04	4.035E+00	-1.141E+02	-2.824E+01	-2.845	[illegible]
0.3175	6.961E+03	6.516E+00	-4.774E+01	1.396E+01	2.857	[illegible]
0.3333	5.445E+03	7.599E+00	-1.524E+01	4.413E+01	1.907	[illegible]
0.3492	6.437E+03	6.755E+00	2.087E+00	5.508E+01	1.537	[illegible]
0.3651	7.507E+03	4.837E+00	1.637E+01	5.421E+01	1.272	[illegible]
0.3810	7.885E+03	3.317E+00	3.144E+01	3.863E+01	0.888	[illegible]
0.3968	7.536E+03	2.976E+00	4.388E+01	2.364E+00	0.054	[illegible]
0.4127	7.208E+03	3.999E+00	4.128E+01	-1.109E+01	-0.265	[illegible]
0.4286	7.176E+03	4.721E+00	1.519E+01	1.971E+00	0.129	[illegible]
0.4444	7.336E+03	4.758E+00	-6.937E+01	3.226E+01	2.709	[illegible]
0.4603	6.999E+03	4.282E+00	-9.788E+01	6.137E+01	2.580	[illegible]
0.4762	6.179E+03	3.539E+00	-8.399E+01	5.566E+01	2.556	[illegible]
0.4921	5.695E+03	3.251E+00	-9.162E+01	1.703E+01	2.958	0.469

Subject 9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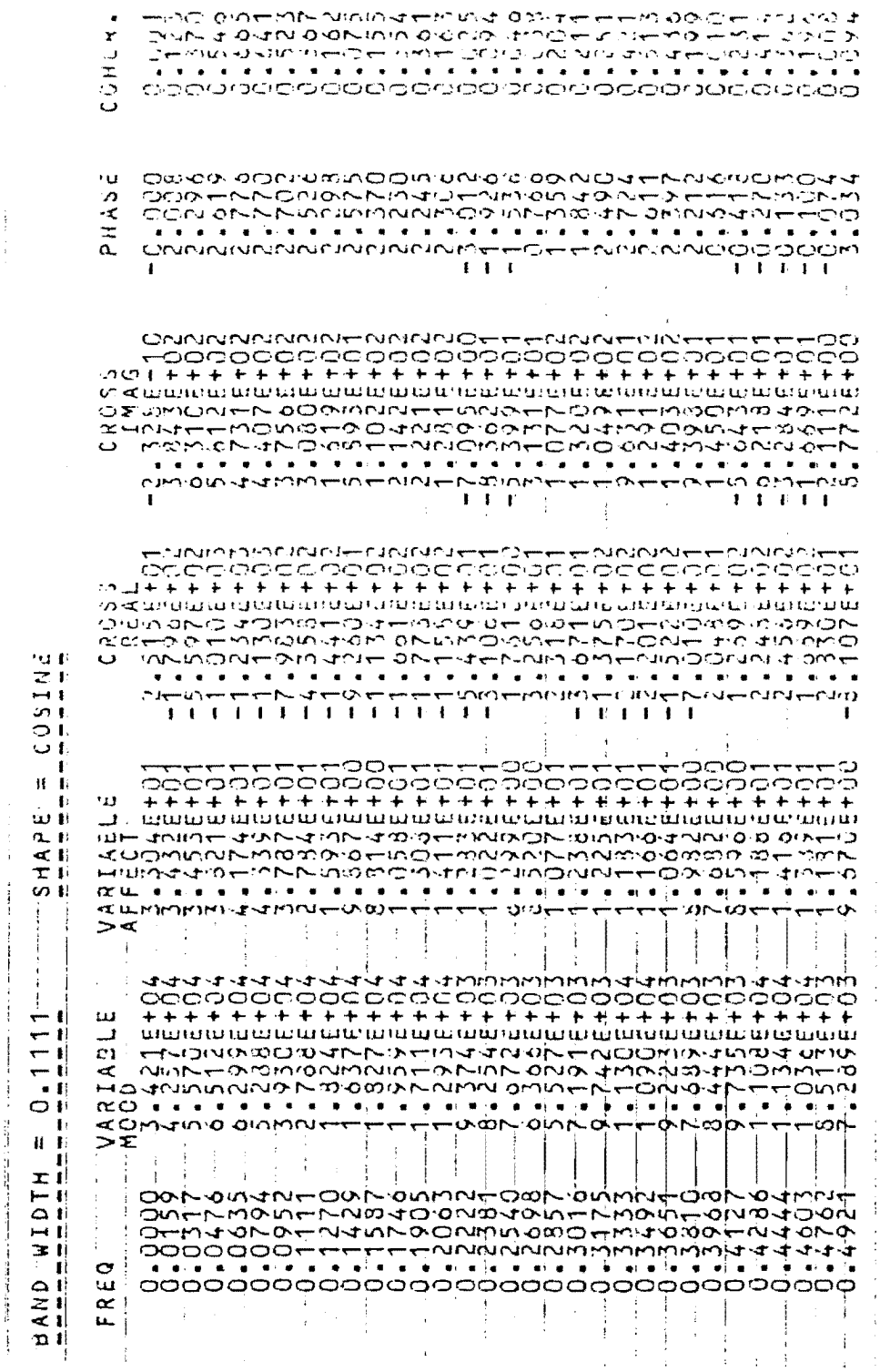
FREQ VARIABLE MODULATION VARIABLE AFFECTED
CROSS-CORRELATION
PHASE
COHER.

Subject 10


BAND WIDTH = 0.1111
SHAPE = COSINE
FREQ
VARIABLE
MOD
VARIABLE
AFF
CROSS
CAL
CROSS
MAG
PHASE
COHER

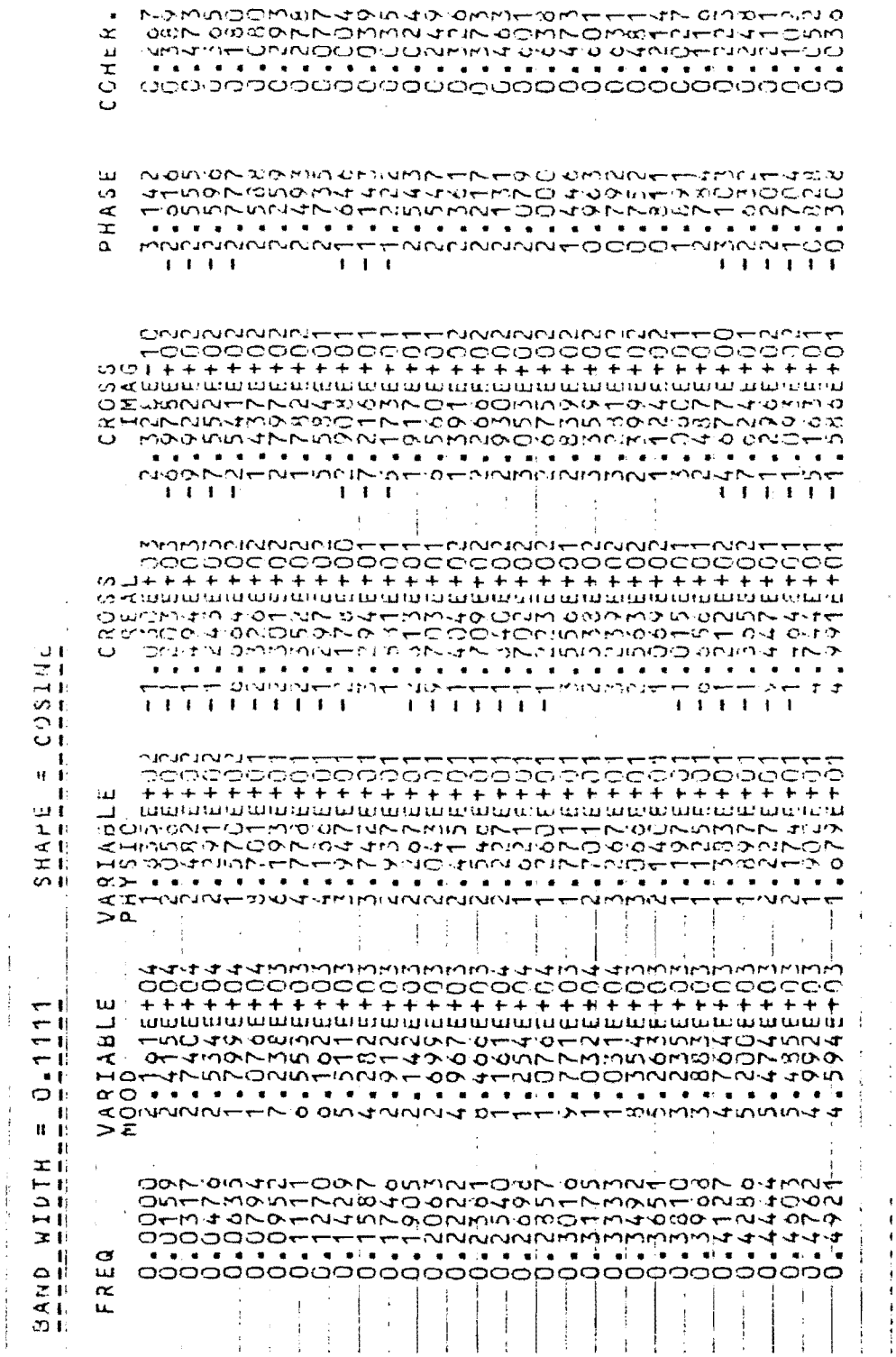
APPENDIX 14

Results of a bivariate analysis for the variables mood and physical symptoms for subjects 3-10.

BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE PHYSIO	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	7.204E+04	[illegible]	-1.[illegible]	[illegible]	3.142	[illegible]
0.0159	7.312E+04	3.343E+01	-1.[illegible]	[illegible]	2.735	[illegible]
0.0317	7.005E+04	3.327E+01	-1.149E+03	7.354E+02	2.572	[illegible]
0.0476	5.959E+04	2.71[illegible]	-[illegible]	[illegible]	[illegible]	[illegible]
0.0635	4.235E+04	1.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.0794	3.251E+04	7.873E+00	[illegible]	[illegible]	[illegible]	[illegible]
0.0952	3.331E+04	7.945E+00	[illegible]	[illegible]	[illegible]	[illegible]
0.1111	3.[illegible]E+04	1.150E+01	-5.144E+02	8.401E+01	[illegible]	[illegible]
0.1270	4.022E+04	1.309E+01	[illegible]	[illegible]	[illegible]	[illegible]
0.1429	3.588E+04	1.140E+01	[illegible]	-1.061E+01	-3.115	[illegible]
0.1587	2.854E+04	8.256E+00	-2.553E+02	-1.[illegible]E+01	-3.085	[illegible]
0.1746	2.136E+04	5.987E+00	-1.077E+0[illegible]	-2.472E+01	-2.916	[illegible]
0.1905	1.573E+04	[illegible]	-7.475E+01	-3.726E+01	-2.679	[illegible]
0.2063	1.063E+04	[illegible]	-7.756E+01	-1.152E+01	-2.994	[illegible]
0.2222	7.874E+03	1.023E+01	-1.[illegible]	1.[illegible]E+01	[illegible]	[illegible]
0.2381	[illegible]	2.362E+01	-1.[illegible]	4.090E+01	[illegible]	[illegible]
0.2540	1.209E+04	[illegible]	[illegible]	3.749E+01	[illegible]	[illegible]
0.2698	1.515E+04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.2857	1.604E+04	[illegible]	[illegible]	1.076E+02	[illegible]	[illegible]
0.3016	1.511E+04	[illegible]	[illegible]	1.102E+02	[illegible]	[illegible]
0.3175	1.349E+04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.3333	1.295E+04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.3492	1.260E+04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.3651	1.177E+04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.3810	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.3968	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.4127	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.4286	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.4444	[illegible]	[illegible]	1.222E+01	5.023E+01	1.319	[illegible]
0.4603	[illegible]	[illegible]	[illegible]	1.055E+02	1.141	[illegible]
0.4762	1.411E+04	[illegible]	[illegible]	1.000E+02	0.988	[illegible]
0.4921	1.645E+04	2.311E+00	[illegible]	4.300E+01	0.565	[illegible]

Subject 4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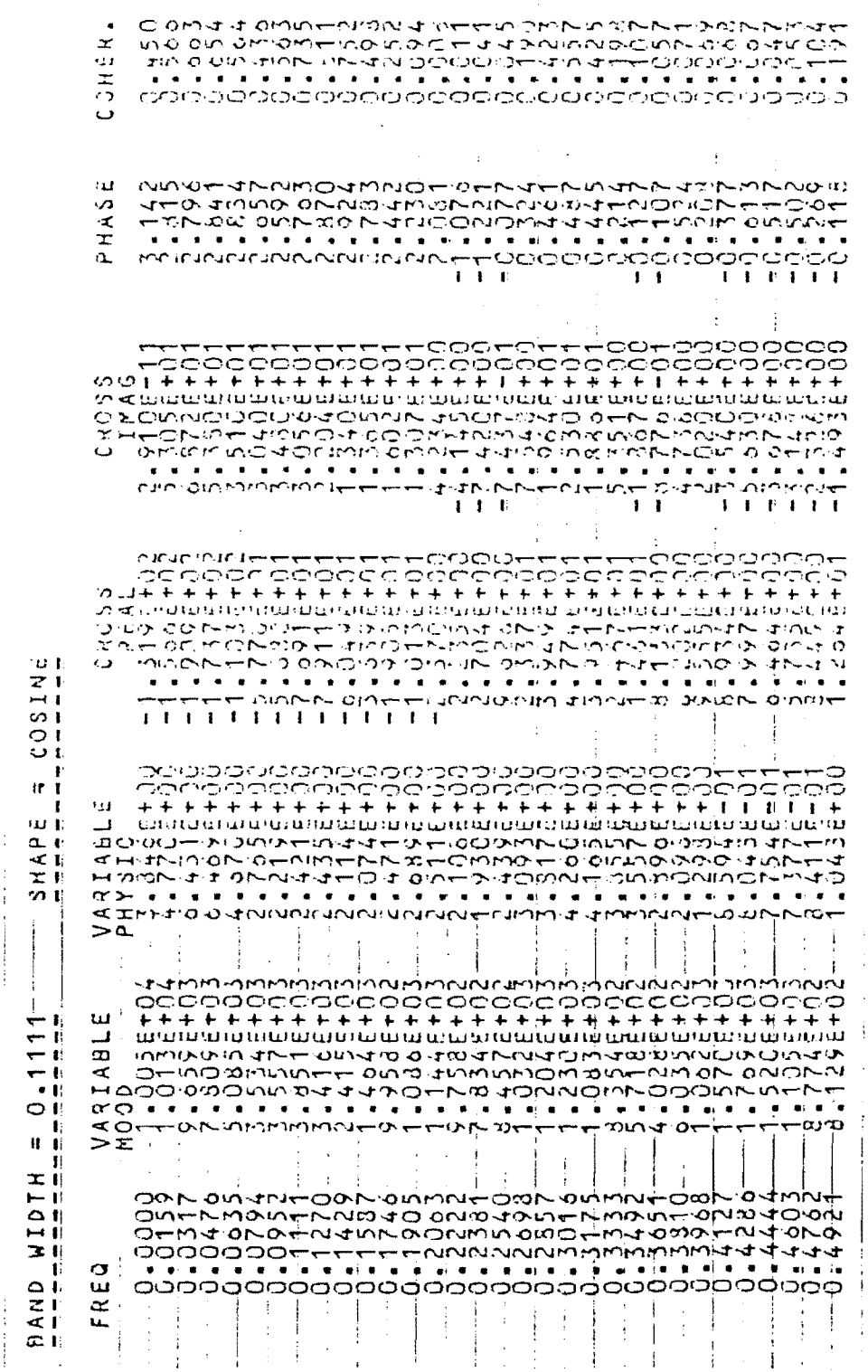
SHAPE = COSINE
FREQ
VARIABLE NO
VARIABLE PHYSICAL
CROSS REAL
CROSS IMAG
PHASE
COHER.

BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIAELE MOOD	VARIABLE PHYSIO	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	3.233E+03	1.[illegible]E+01	2.[illegible]E+00	-7.[illegible]E-11	-0.000	0.000
0.0159	3.569E+03	1.[illegible]E+01	1.[illegible]E+01	-1.[illegible]E+02	-1.467	0.[illegible]
0.0317	4.959E+03	1.[illegible]E+01	9.[illegible]E+00	-1.[illegible]E+02	-1.437	0.[illegible]
0.0476	6.[illegible]E+03	1.[illegible]E+01	-1.[illegible]E+01	-1.[illegible]E+01	-2.[illegible]	0.[illegible]
0.0635	9.385E+03	1.[illegible]E+01	-[illegible].[illegible]E+01	1.[illegible]E+02	1.[illegible]	0.[illegible]
0.0794	1.224E+04	8.[illegible]E+00	-5.[illegible]E+01	1.[illegible]E+02	1.905	0.[illegible]
0.0952	1.371E+04	4.[illegible]E+00	-1.[illegible]E+01	1.[illegible]E+02	1.[illegible]	0.[illegible]
0.1111	1.250E+04	3.[illegible]E+00	2.[illegible]E+01	2.[illegible]E+01	0.[illegible]	0.[illegible]
0.1270	9.[illegible]E+03	3.[illegible]E+00	[illegible].[illegible]E+01	-5.[illegible]E+00	-[illegible].[illegible]	0.[illegible]
0.1429	7.197E+03	5.[illegible]E+00	-1.[illegible]E+01	1.[illegible]E+01	2.[illegible]	0.[illegible]
0.1587	5.317E+03	5.373E+00	-5.[illegible]E+01	5.995E+01	2.[illegible]	0.[illegible]
0.1746	4.164E+03	3.[illegible]E+00	-[illegible].[illegible]E+01	4.[illegible]E+01	2.[illegible]	0.[illegible]
0.1905	4.322E+03	2.[illegible]E+00	-[illegible].[illegible]E+01	2.681E+01	2.735	0.[illegible]
0.2063	5.294E+03	1.[illegible]E+00	-[illegible].[illegible]E+01	-[illegible].[illegible]E+00	-3.[illegible]	0.[illegible]
0.2222	6.036E+03	2.[illegible]E+00	-5.[illegible]E+01	-2.[illegible]E+01	-2.699	0.[illegible]
0.2381	5.231E+03	3.[illegible]E+00	-[illegible].[illegible]E+01	-4.[illegible]E+01	-2.316	0.[illegible]
0.2540	3.413E+03	[illegible].[illegible]E+00	-9.[illegible]E+00	-[illegible].[illegible]E+01	-1.779	0.[illegible]
0.2698	1.696E+03	2.[illegible]E+00	[illegible].[illegible]E+00	-3.[illegible]E+01	-1.[illegible]	0.[illegible]
0.2857	1.273E+03	1.[illegible]E+00	-4.[illegible]E+00	-1.[illegible]E+01	-1.[illegible]	0.[illegible]
0.3016	1.417E+03	1.732E+00	-1.[illegible]E+01	-1.[illegible]E+01	-2.173	0.[illegible]
0.3175	2.156E+03	2.174E+00	-[illegible].[illegible]E+00	-3.232E+01	-1.[illegible]	0.[illegible]
0.3333	3.197E+03	3.[illegible]E+00	-1.[illegible]E+01	-4.465E+01	-1.[illegible]	0.[illegible]
0.3492	3.816E+03	3.714E+00	-[illegible].[illegible]E+01	-3.[illegible]E+01	-[illegible].199	0.[illegible]
0.3651	3.700E+03	[illegible].[illegible]E+00	-2.[illegible]E+01	3.[illegible]E+00	2.999	0.[illegible]
0.3810	3.[illegible]E+03	[illegible].[illegible]E+00	-1.[illegible]E+01	[illegible].[illegible]E+01	[illegible].049	0.[illegible]
0.3968	2.555E+03	1.[illegible]E+00	-9.[illegible]E+00	[illegible].[illegible]E+01	1.[illegible]	0.[illegible]
0.4127	2.483E+03	1.288E+00	-1.[illegible]E+01	2.[illegible]E+01	2.[illegible]	0.[illegible]
0.4286	3.122E+03	1.[illegible]E+00	-[illegible].[illegible]E+01	1.149E+01	2.916	0.[illegible]
0.4444	3.[illegible]E+03	2.643E+00	-[illegible].[illegible]E+01	1.[illegible]E+01	2.948	0.[illegible]
0.4603	3.919E+03	[illegible].[illegible]E+00	-7.[illegible]E+01	[illegible].[illegible]E+01	2.[illegible]	0.[illegible]
0.4762	3.224E+03	3.913E+00	-4.[illegible]E+01	[illegible].[illegible]E+01	2.[illegible]	0.[illegible]
0.4921	2.260E+03	4.090E+00	-1.467E+00	1.[illegible]E+01	1.680	0.[illegible]

Subject 6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FREQ
VARIABLE
MOD
VARIABLE
PHY
CROSS
CROSS
CROSS
PHASE
COHER.

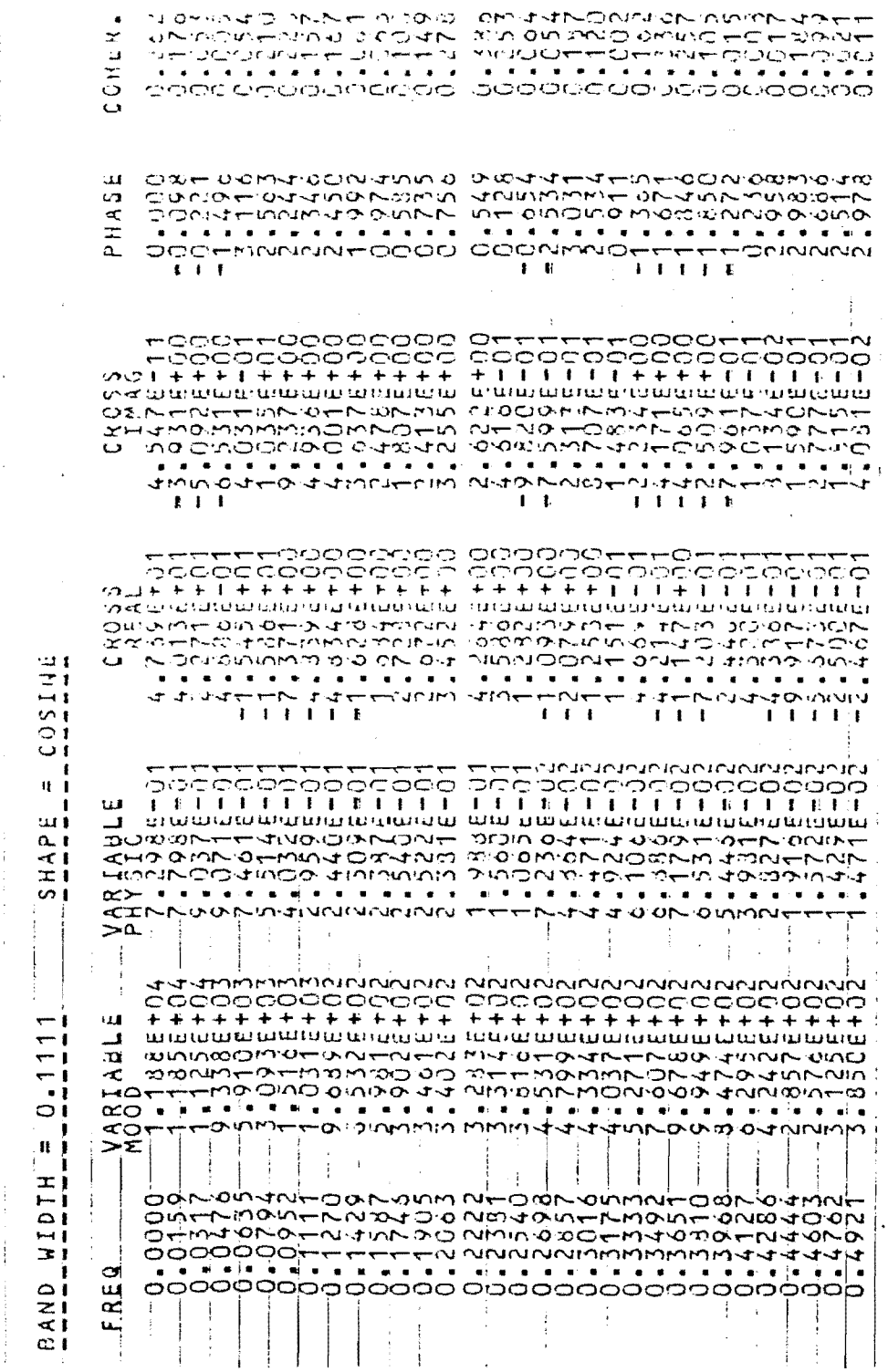
BAND WIDTH = 0.1250 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE PHYSIC	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	2.169E+04	2.521E+00	-4.343E+01	-3.456E-11	-3.142	0.034
0.0179	3.442E+04	2.562E+00	-7.491E+01	-1.697E+01	-2.919	0.067
0.0357	5.432E+04	3.390E+00	-1.485E+02	-5.959E+01	-2.760	0.139
0.0536	6.024E+04	4.366E+00	-1.933E+02	-9.304E+01	-2.676	0.141
0.0714	4.696E+04	5.006E+00	-1.139E+02	-7.982E+01	-2.520	0.082
0.0893	2.472E+04	5.037E+00	-5.600E+01	-2.473E+01	-2.540	0.015
0.1071	9.133E+03	4.161E+00	1.019E+00	3.575E+01	1.542	0.004
0.1250	5.669E+03	2.791E+00	1.522E+01	5.951E+01	1.320	0.033
0.1429	6.730E+03	2.051E+00	1.436E+01	5.950E+01	1.334	0.271
0.1607	8.704E+03	1.707E+00	1.820E+01	7.582E+01	1.335	0.409
0.1786	1.040E+04	1.620E+00	1.939E+01	1.050E+02	1.384	0.603
0.1964	1.010E+04	1.732E+00	1.695E+00	1.118E+02	1.491	0.699
0.2143	7.985E+03	1.459E+00	3.632E+00	3.957E+01	1.530	0.690
0.2321	5.597E+03	1.257E+00	6.064E+00	9.004E+01	1.470	0.516
0.2500	4.331E+03	1.437E+00	8.135E+00	5.083E+01	1.529	0.416
0.2679	3.369E+03	1.369E+00	-8.997E+00	4.704E+01	1.758	0.354
0.2857	3.017E+03	2.170E+00	-1.321E+01	4.544E+01	1.952	0.366
0.3036	3.009E+03	2.240E+00	-1.039E+01	4.655E+01	1.790	0.338
0.3214	3.306E+03	2.083E+00	7.757E+00	4.638E+01	1.407	0.325
0.3393	3.745E+03	1.711E+00	1.738E+01	4.127E+01	1.172	0.313
0.3571	3.775E+03	1.265E+00	1.353E+01	2.587E+01	1.089	0.179
0.3750	3.182E+03	1.116E+00	3.910E+00	2.159E+00	0.350	0.011
0.3929	3.743E+03	1.178E+00	-8.740E+00	-9.715E+00	-1.846	0.023
0.4107	5.436E+03	1.574E+00	3.994E-01	-4.071E+00	-1.473	0.002
0.4286	7.689E+03	1.908E+00	2.008E+01	-2.143E+00	-0.106	0.028
0.4464	9.693E+03	2.233E+00	5.850E+01	-1.642E+01	-0.273	0.171
0.4643	9.966E+03	2.443E+00	9.154E+01	-3.430E+01	-0.363	0.394
0.4821	9.354E+03	2.729E+00	1.130E+02	-3.032E+01	-0.269	0.529
0.5000	9.434E+03	2.734E+00	1.160E+02	-1.796E-11	-0.000	0.513

BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE MOOD	VARIABLE PHYSIO	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	5.398E+04	2.165E+02	-1.[illegible]41E+03	5.969E-10	3.142	0.132
0.0159	5.929E+04	2.075E+02	-1.503E+03	-9.841E+02	-2.585	0.552
0.0317	6.638E+04	1.810E+02	-2.169E+03	-1.269E+03	-2.612	0.522
0.0476	6.207E+04	1.521E+02	-2.036E+03	-8.294E+02	-2.763	0.615
0.0635	4.926E+04	6.774E+01	-1.362E+03	-3.586E+02	-2.834	0.594
0.0794	4.052E+04	2.719E+01	-8.432E+02	-2.136E+02	-2.770	0.214
0.0952	3.826E+04	1.455E+01	-2.256E+02	-1.629E+02	-2.461	0.153
0.1111	3.228E+04	2.341E+01	-3.026E+02	-2.176E+02	-2.320	0.117
0.1270	2.210E+04	3.838E+01	-7.044E+02	-2.736E+02	-3.339	0.171
0.1429	1.824E+04	4.570E+01	-7.493E+02	-4.186E+02	-2.667	0.157
0.1587	2.100E+04	4.148E+01	-4.046E+02	-5.553E+02	-2.201	0.542
0.1746	2.371E+04	3.779E+01	-4.750E+02	-5.473E+02	-2.236	0.526
0.1905	2.206E+04	3.947E+01	-5.605E+02	-4.120E+02	-2.472	0.506
0.2063	2.042E+04	4.175E+01	-4.950E+02	-2.747E+02	-2.635	0.373
0.2222	1.951E+04	3.336E+01	-3.464E+02	-1.685E+02	-2.689	0.215
0.2381	2.040E+04	2.415E+01	-1.732E+02	-1.081E+02	-2.371	0.118
0.2540	1.991E+04	1.438E+01	-6.125E+01	-1.650E+02	-1.952	0.105
0.2698	1.733E+04	1.477E+01	-4.582E+01	-8.424E+01	-2.069	0.039
0.2857	1.350E+04	1.594E+01	-3.700E+01	4.783E+01	2.229	0.017
0.3016	1.062E+04	1.613E+01	-1.012E+01	1.445E+02	1.641	0.132
0.3175	6.961E+03	1.522E+01	5.516E+01	-1.360E+02	1.318	0.126
0.3333	5.445E+03	1.321E+01	5.903E+01	1.413E+01	0.235	0.051
0.3492	6.437E+03	1.183E+01	2.923E+01	-8.039E+01	-1.[illegible]	0.097
0.3651	7.507E+03	1.210E+01	-3.559E+01	-8.119E+01	-1.[illegible]	0.087
0.3810	7.885E+03	1.215E+01	-8.[illegible]06E+01	-5.720E+00	-3.077	0.[illegible]
0.3968	7.536E+03	1.294E+01	-1.051E+02	7.168E+01	2.543	0.162
0.4127	7.208E+03	1.340E+01	-8.739E+01	8.463E+01	2.375	0.154
0.4286	7.176E+03	1.327E+01	-6.162E+01	3.425E+01	2.634	0.052
0.4444	7.336E+03	1.208E+01	-7.530E+01	2.704E+00	3.106	0.064
0.4603	6.999E+03	9.501E+00	-1.011E+02	3.630E+00	3.105	0.152
0.4762	6.179E+03	7.244E+00	-1.109E+02	2.121E+01	2.952	0.245
0.4921	5.095E+03	6.870E+00	-1.337E+02	1.351E+01	3.041	0.461

Subject 9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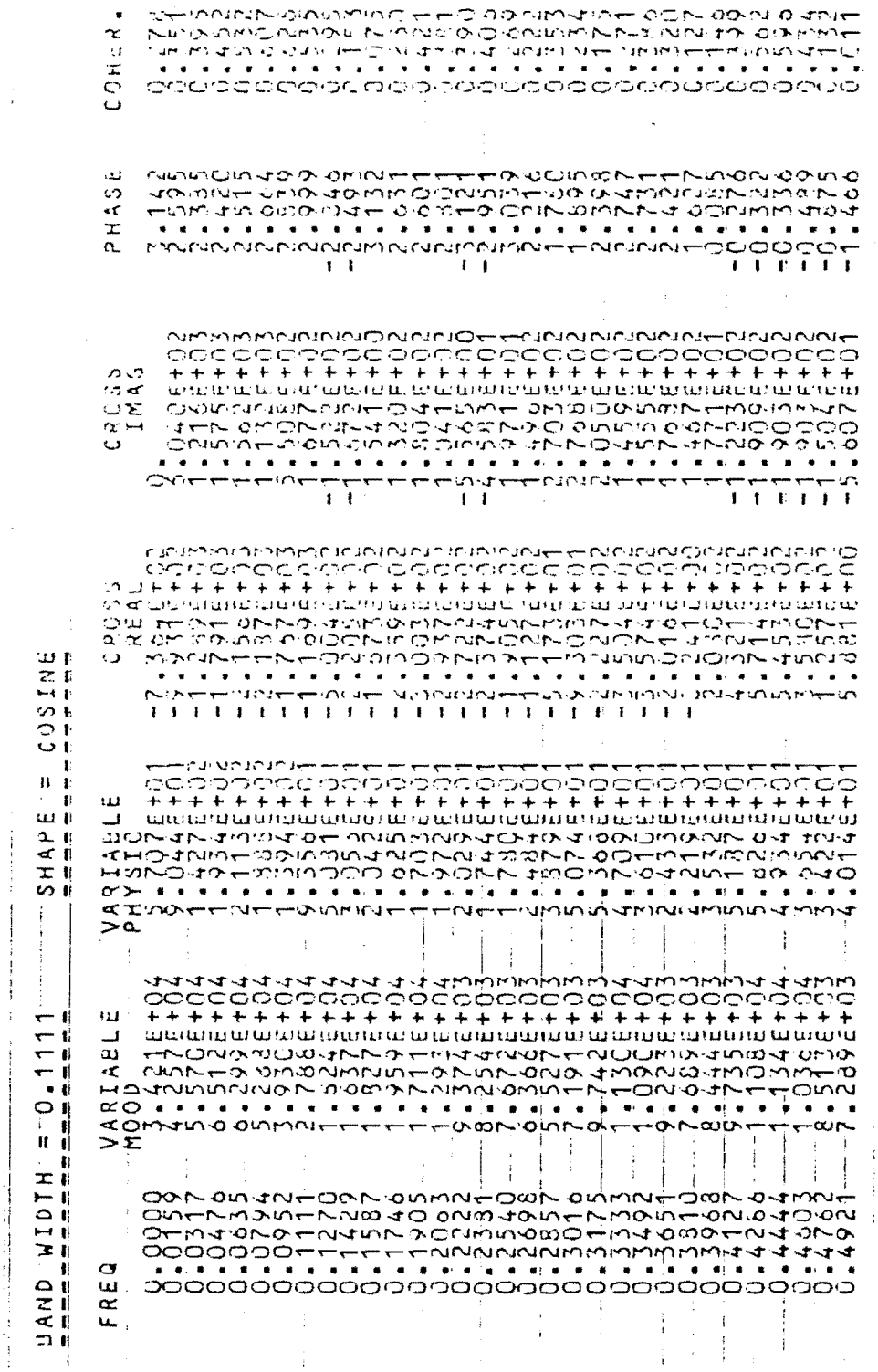
SHAPE = COSINE
FREQ
VARIABLE
MOD
VARIABLE
PHY
CROSS
CROSS
CROSS
PHASE
COHER.

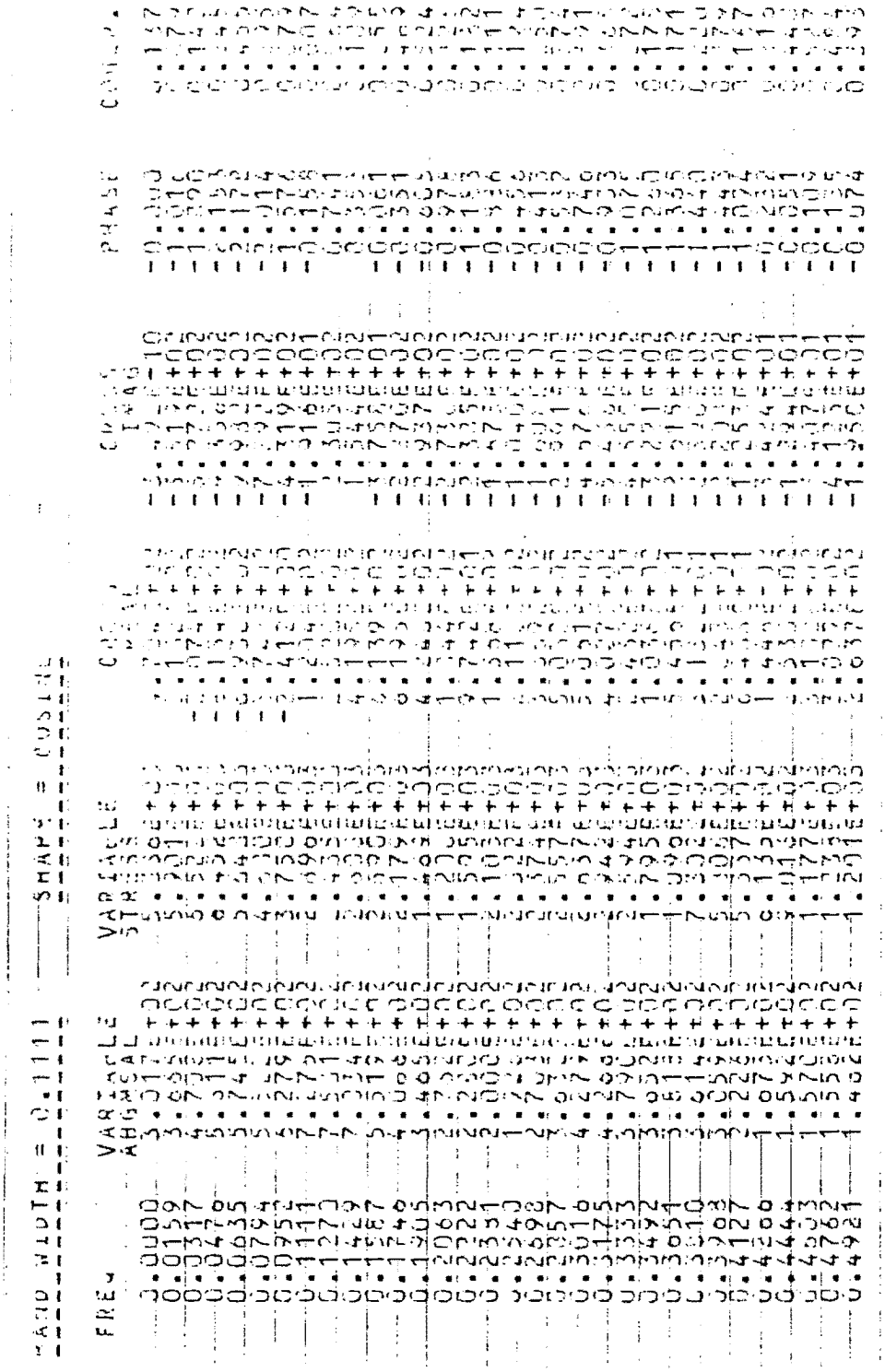
Subject 10


BAND WIDTH = 0.1111
SHAPE = COSINE
FREQ
VARIABLE MOD
VARIABLE PHYSIO
CROSS REAL
CROSS IMAG
PHASE
COHER

APPENDIX 15

Results of a bivariate analysis for the variables alcohol and stress for subjects 3-10.

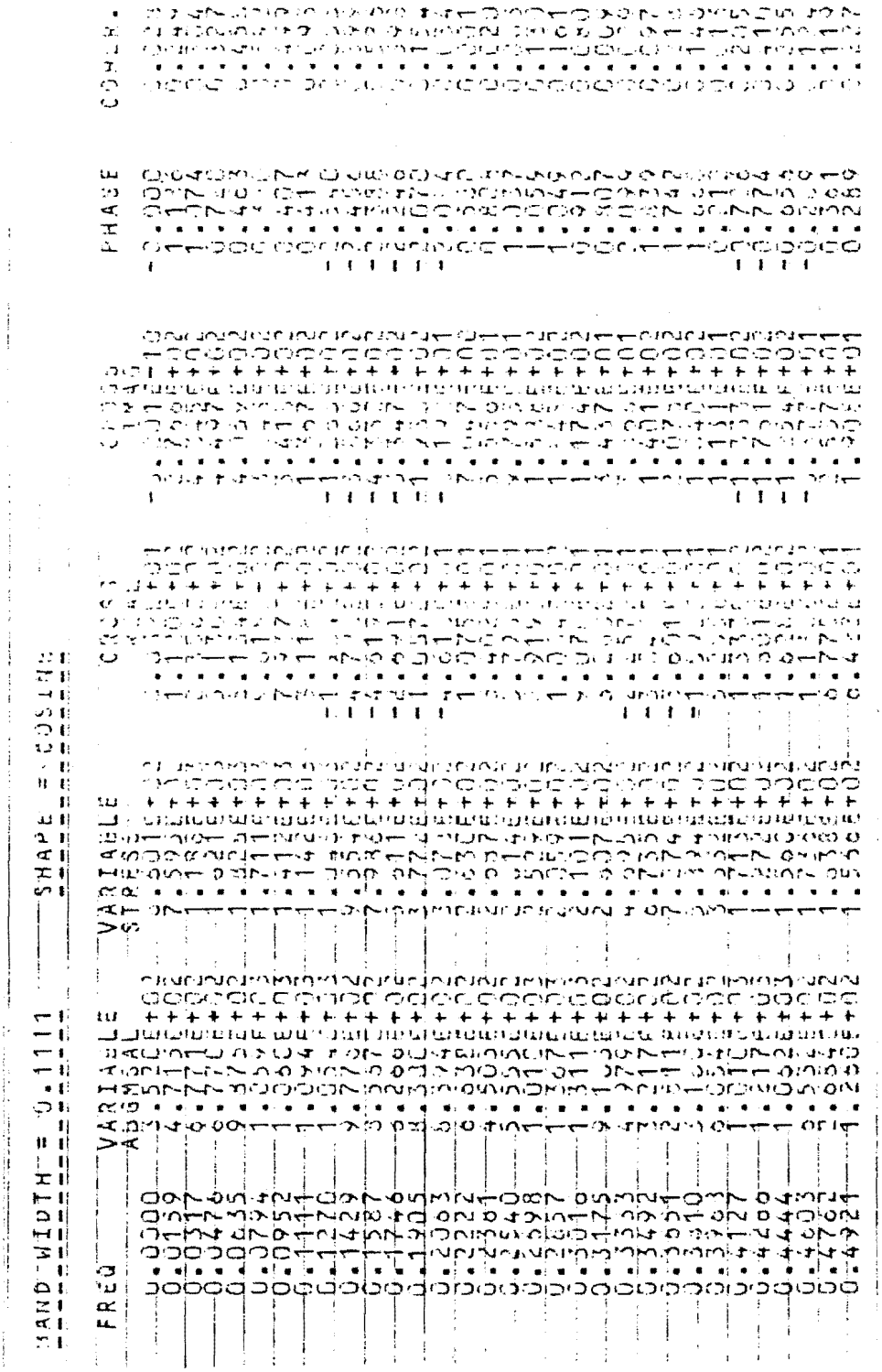
Subject 3



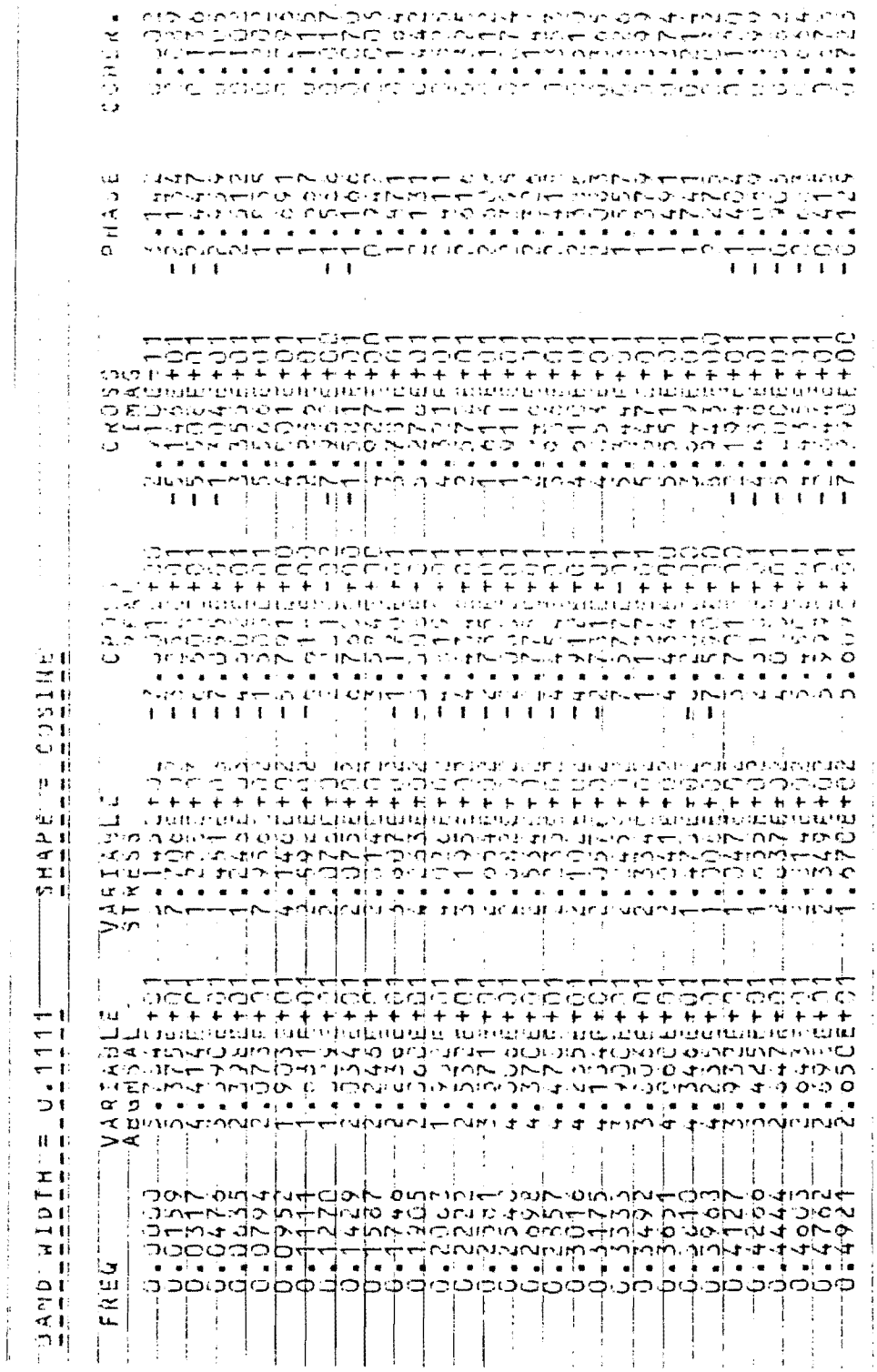
BAND WIDTH = 0.1111 SHAPE = COSINE

FREQ	VARIABLE AFGMSAL	VARIABLE STRESS	CROSS REAL	CROSS IMAG	PHASE	COHER.
0.0000	3.466E+02	2.361E+02	7.713E+01	3.447E+00	0.000	0.00
0.0159	3.777E+02	2.845E+02	1.552E+02	1.124E+02	0.636	0.0
0.0317	4.527E+02	2.675E+02	5.019E+01	2.189E+02	0.629	0.1
0.0476	4.313E+02	2.148E+02	2.511E+02	2.685E+02	0.818	0.1
0.0635	3.303E+02	1.330E+02	2.306E+01	2.764E+02	1.246	0.1
0.0794	2.503E+02	7.739E+01	1.851E+01	2.562E+02	1.550	0.
0.0952	2.930E+02	6.474E+01	-3.641E+01	2.068E+02	1.749	0.
0.1111	6.223E+02	8.970E+02	-2.226E+02	7.275E+00	3.107	0.0
0.1270	1.100E+03	1.176E+03	-4.625E+02	-2.422E+02	-2.647	0.
0.1429	1.431E+03	1.236E+03	-5.331E+02	-3.989E+02	-2.499	0.
0.1587	1.476E+03	1.225E+03	-5.305E+02	-2.329E+02	-2.528	0.0
0.1746	1.228E+03	1.427E+03	2.394E+01	5.648E+01	1.155	0.
0.1905	9.086E+02	1.762E+03	2.226E+02	2.078E+02	0.751	0.0
0.2063	7.012E+02	1.872E+03	1.090E+02	1.035E+02	0.760	0.0
0.2222	5.106E+02	1.452E+03	-3.504E+01	-2.988E+01	-2.456	0.0
0.2381	5.581E+02	8.155E+02	6.280E+01	1.121E+01	2.965	0.0
0.2540	8.042E+02	4.680E+02	-1.553E+01	2.459E+02	1.634	0.
0.2698	9.846E+02	4.509E+02	7.288E+00	3.572E+02	3.560	0.
0.2857	9.258E+02	4.502E+02	-6.103E+01	3.045E+02	1.769	0.
0.3016	6.482E+02	3.539E+02	-1.009E+02	1.721E+02	2.101	0.
0.3175	3.594E+02	2.091E+02	-6.494E+01	6.073E+01	2.390	0.
0.3333	2.719E+02	1.110E+02	-1.919E+00	5.454E+01	1.508	0.
0.3492	3.571E+02	1.091E+02	-3.673E+01	1.177E+02	1.873	0.
0.3651	5.038E+02	1.630E+02	-9.741E+01	1.874E+02	2.056	0.
0.3810	5.964E+02	2.318E+02	-1.310E+02	2.335E+02	2.082	0.
0.3968	6.165E+02	3.637E+02	-1.557E+02	1.853E+02	2.378	0.
0.4127	5.433E+02	5.792E+02	1.549E+02	-1.097E+01	-3.071	0.
0.4286	5.771E+02	7.358E+02	-1.356E+02	-1.527E+02	-2.275	0.
0.4444	8.082E+02	7.392E+02	-6.732E+01	-1.319E+02	-2.043	0.
0.4603	1.010E+03	6.251E+02	1.701E+02	5.008E+01	1.254	0.
0.4762	1.052E+03	5.125E+02	5.239E+01	1.705E+02	1.583	0.
0.4921	1.016E+03	4.872E+02	8.023E+00	8.438E+01	1.478	0.

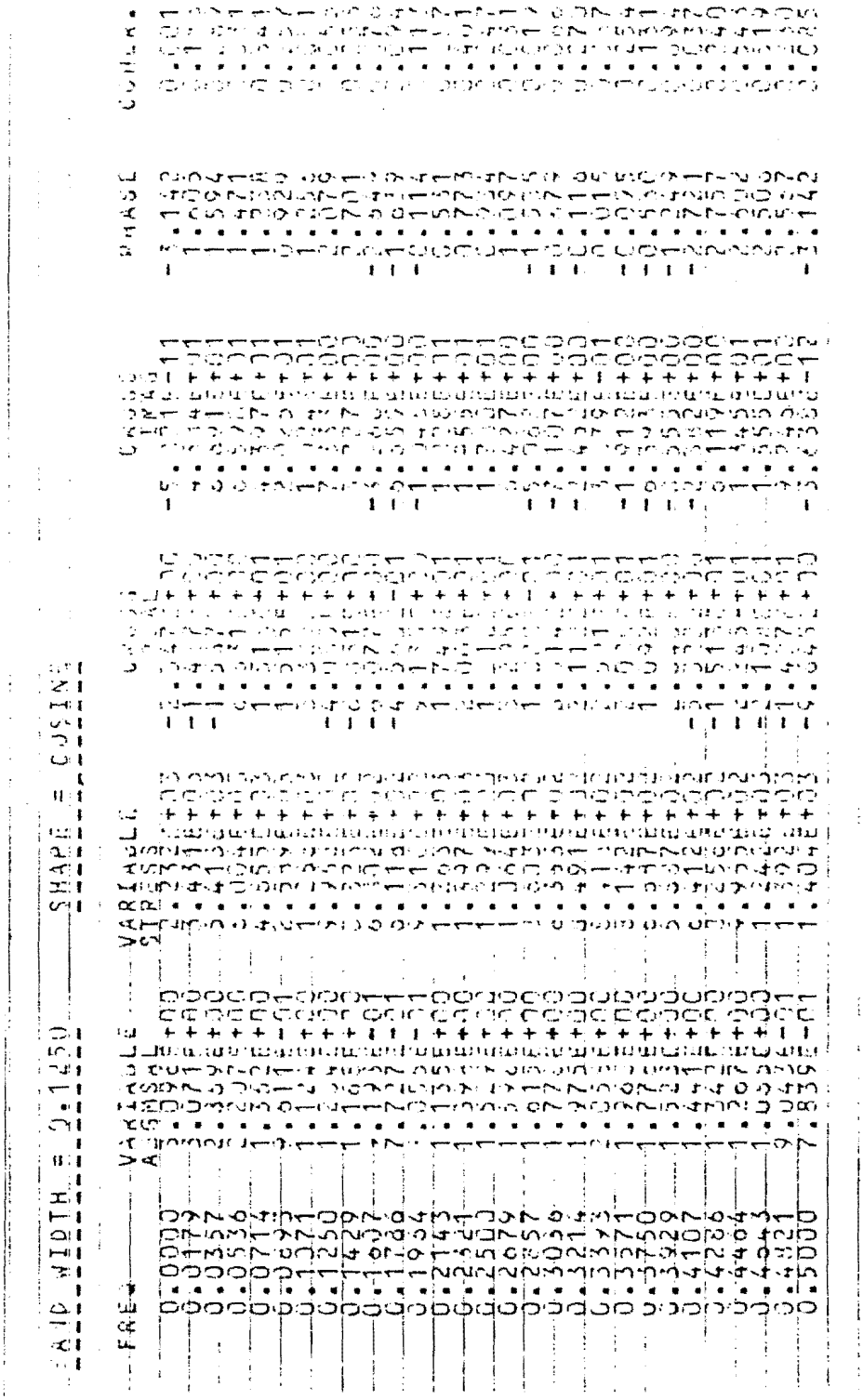
Subject 5



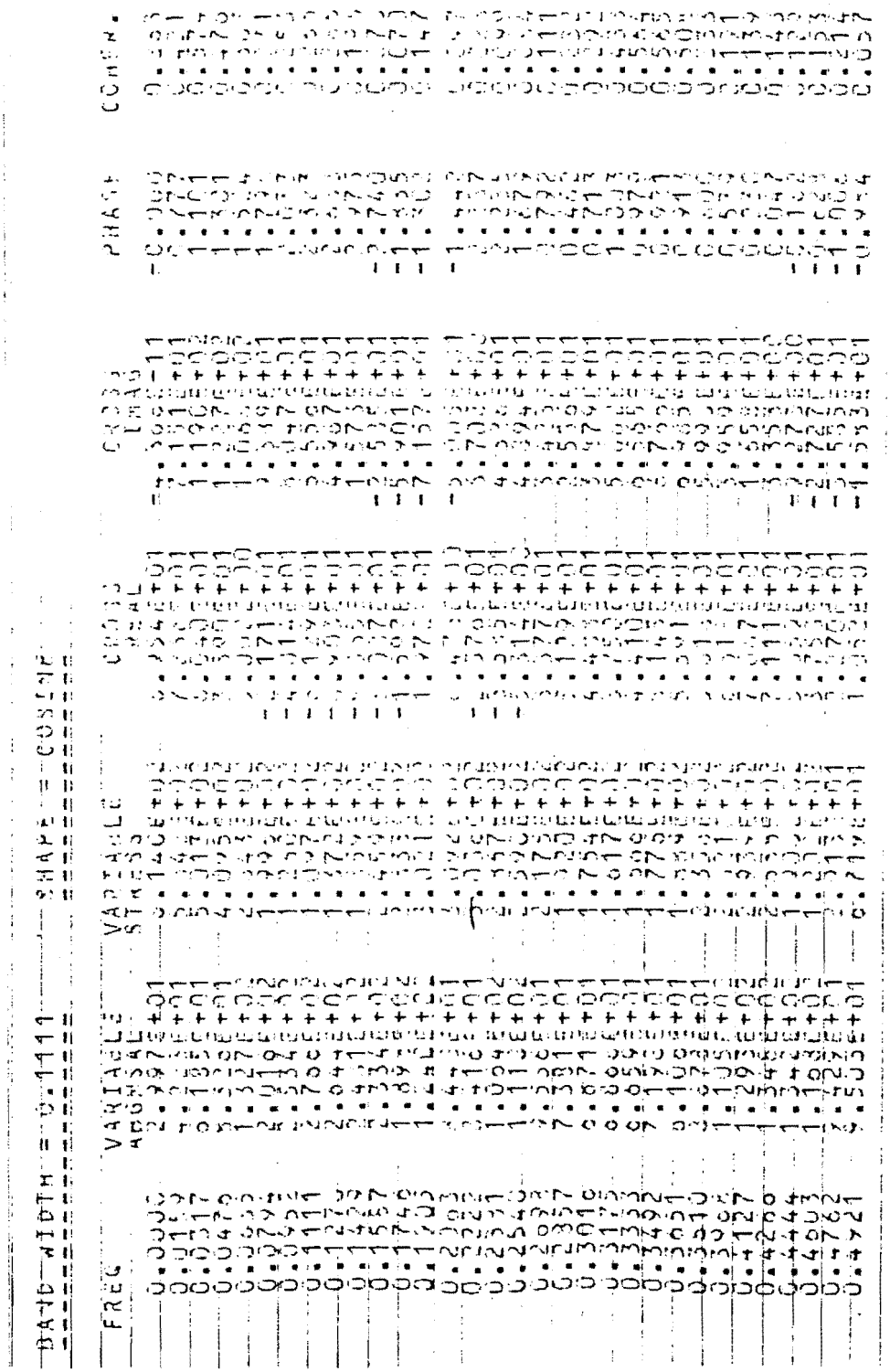
Subject 6



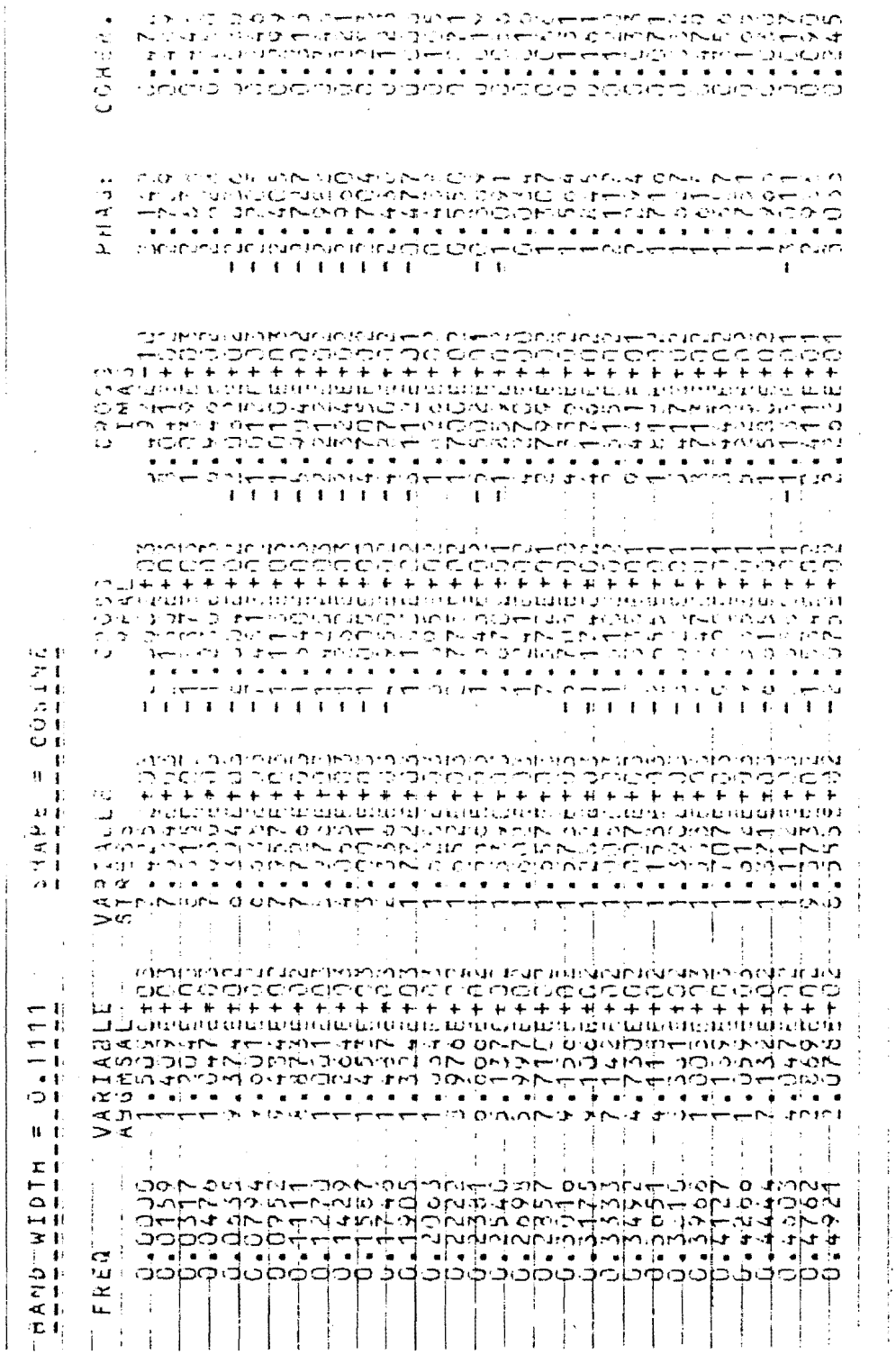
Subject 7



Subject 9



Subject 8



Subject 10